engraver relies on the accuracy of the artist's work for successful interpretation. An entry that is a line pencil drawing, scratchboard, or an etching should effectively interpret the full range of tone, rather than duplicate line engraving techniques of past Migratory Bird Hunting and Conservation Stamps. The engraver is primarily responsible for line interpretation and discipline, creating the miniature image of the stamp.

§ 91.16 Submission procedures for entry.

(a) Each contestant may submit only one entry. Each entry must be accompanied by a non-refundable entrance fee and a completed and signed Reproduction Rights Agreement and a completed and signed Display Agreement. The bottom portion of the Reproduction Rights Agreement must be attached to the back of the entry.

(b) Each entry should be appropriately wrapped to protect the art work and sent by registered mail or hand delivered to: Migratory Bird Hunting and Conservation Stamp Contest, U.S. Fish and Wildlife Service, Room 7049, Department of the Interior, Washington,

DC 20240.

§ 91.17 Property insurance for entries.

Each contestant is responsible for obtaining adequate insurance coverage for his/her entry. The Department of the Interior will not insure the entries it receives. The Department of the Interior is not responsible for loss or damage unless it is caused by its negligence or willful misconduct; in any event, the liability of the Department of the Interior will not exceed the amount of the fifty dollar (\$50.00) entry fee.

§ 91.18 Failure to comply with contest regulations.

Any entry that does not comply with the requirements of Subpart B will be disqualified from the contest.

Subpart C—Procedures for Administering the Contest

§ 91.21 Selection and qualification of contest judges.

Judges will be selected annually by the Secretary of the Interior. Current employees of the Fish and Wildlife Service and their relatives are ineligible to serve as judges for the contest. The judges will be reimbursed for reasonable travel expenses. The judges will be announced on the first day of the contest.

§ 91.22 Display of entries for contest.

All eligible entries will be displayed in the Department of the Interior auditorium in numerical order. The only visible identification on each entry will be the number assigned to it in chronological order when it is received and processed by the Service.

§ 91.23 Scoring criteria for contest.

Entries will be judged on the basis of anatomical accuracy, artistic composition and suitability for engraving in the production of a stamp.

§ 91.24 Contest procedures.

(a) The day before the judging begins, the judges will be briefed on all aspects of the judging procedures and other details of the competition, and will preview all eligible artwork entered.

(b) Prior to the first round of judging, the judges will spend an additional two hours in the auditorium reviewing the entries the first day before the official

contest is open to the public.

(c) All qualified entries will be shown one at a time to the judges by the Contest Coordinator or a contest staff member. The judges will vote "in" or "out" on each entry; those entries receiving a majority of votes "in" will be eligible for the second round of judging. The remaining entries will be placed on display as a group for public viewing.

(d) Prior to the second round of judging, each judge may select not more than five entries from those eliminated in the first round. Those additional entries selected by the judges will be eligible to be judged in the second

round.

(e) Prior to the second round of judging, the entries selected by the judges under the procedures of paragraphs (c) and (d) of this section will be displayed in numerical order in the front of the auditorium.

(f) In the second round of judging, each entry selected in the first round, plus the additional entries selected by judges, will be shown one at a time to the judges by the Contest Coordinator or a contest staff member. The judges will vote by indicating a numerical score from one to nine for each entry. One highest and one lowest score for each entry will be eliminated and the remaining scores will be totaled to provide the entry score. The entries receiving the five highest scores will be advanced to the third and final round.

(g) In the third round of judging, the judges will vote on the remaining entries using the same method as in round two. The Contest Coordinator will tabulate the final votes and present them to the Director, U.S. Pish and Wildlife Service, who will announce the winning entry as well as the entries that placed second and third.

(h) In case of a tie vote for first, second, or third place in the final round, the judges will vote again on the entries that are tied. The judges will vote using the same method as in rounds two and three.

(i) The selection of the winning entry by the judges will be final. Each contestant will be notified of the winning artist and the design. The winning artist will receive a pane of Duck Stamps signed by the Secretary of the Interior at the Duck Stamp Contest the following year. The artists placing first, second, and third will receive a framed commendation from the Director of the U.S. Fish and Wildlife Service.

Subpart D-Post-Contest Procedures

§ 91.31 Return of entries after contest.

All entries will be returned by certified mail to the participating artists within 120 days after the contest. If artwork is returned to the Service because it is undelivered or unclaimed (this may happen if an artist changes address), the Service will not be obligated to trace the location of the artist to return the artwork. Any artist who changes his or her address is responsible for notifying the Service of the change. All unclaimed entries will be destroyed one year from the date of the contest.

Date: April 14, 1988.

Susan Recce,

Acting Assistant Secretary for Fish and Wildlife and Parks.

[FR Doc. 88-10037 Filed 5-5-88; 8:45 am]



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Friday May 6, 1988



Environmental Protection Agency

40 CFR Parts 141 and 142
National Primary Drinking Water
Regulations; Filtration and Disinfection;
Turbidity, Giardia lamblia, Viruses,
Legionella, and Heterotrophic Bacteria;
Total Coliforms; Notice of Availability;
Close of Public Comment Period;
Proposed Rule



ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 141 and 142

[FRL-3375-7]

National Primary Drinking Water Regulations; Filtration and Disinfection; Turbidity, Giardia lamblia, Viruses, Legionella, and Heterotrophic Bacteria; Total Coliforms

AGENCY: Environmental Protection Agency.

ACTION: Notice of availability; close of public comment period.

SUMMARY: On November 3, 1987, EPA proposed surface water treatment requirements and a national primary drinking water regulation for total coliforms, plus maximum contaminant level goals for certain microbiological contaminants under the Safe Drinking Water Act (52 FR 42178 and 52 FR 42224). In today's notice, EPA is soliciting specific data, offering additional regulatory options for comment, and clarifying and correcting statements made in the November 3, 1987, proposals. In general, these options would increase the States' latitude in applying the proposed filtration criteria and certain other proposed requirements to account for site-specific considerations. The public comment period on the November 3, 1987, proposals and today's notice will close on July 5, 1988.

DATES: The public comment period on the November 3, 1987, proposals and today's notice closes July 5, 1988.

Another public hearing on these two proposed rules will be held on June 27, 1988, from 9:00 am to 4:00 pm in North Conference Room #3, at the Environmental Protection Agency, 401 M Street SW., Washington, DC 20460.

ADDRESSES: Send written comments on the November 3, 1987, proposed rules and today's notice to Surface Water **Treatment Requirements Comment** Clerk, or Coliforms Comment Clerk, as appropriate, Criteria and Standards Division, Office of Drinking Water (WH-550D), Environmental Protection Agency, 401 M Street SW., Washington, DC 20460. A copy of the comments and supporting documents will be available for review at the EPA Drinking Water Docket, 401 M Street SW., Washington, DC 20460. For access to the docket materials, call (202) 382-3027 between 9:00 am and 3:30 pm.

FOR FURTHER INFORMATION CONTACT: The Safe Drinking Water Hotline, telephone (800) 426–4791, or (202) 382– 5533 in the Washington, DC, metropolitan area, or Stig Regli (surface water treatment requirements) or Paul S. Berger, Ph.D. (total coliforms), Science and Technology Branch, Criteria and Standards Division, Office of Drinking Water (WH-550D), Environmental Protection Agency, 401 M Street SW., Washington, DC 20460, telephone (202) 382–7379 or 382–3039. If you plan to attend the public hearing, contact Marlene Regelski, EPA (WH-550D), 401 M Street SW., Washington, DC 20460, telephone (202) 382–3639, at least two weeks before the hearing date.

SUPPLEMENTARY INFORMATION:

I. Background

As required by the 1986 amendments to the Safe Drinking Water Act, EPA published two proposed rules on November 3, 1987; these rules would regulate turbidity, Giardia lamblia, viruses, Legionella, heterotrophic bacteria, and total coliforms; establish criteria by which States would determine which public water systems using surface water must practice filtration; and establish disinfection requirements for all public water systems using surface water (52 FR 42178 and 52 FR 42224). Two public hearings on these proposals have been held to date: In Washington, DC, on November 23-24, 1987; and Denver, Colorado, on December 2-3, 1987.

On January 4, 1988, the Agency published a notice extending the public comment period for these two proposed rules (53 FR 31). The notice indicated that a subsequent Federal Register notice would set the closing date for the public comment period, and that EPA would hold at least one additional public hearing. The January 4, 1988, notice also stated that EPA would soon publish another notice describing additional information and other possible regulatory options for public comment.

This is the subsequent notice referred to in the January 4, 1988, Federal Register notice. In this notice, EPA is soliciting specific data, offering additional regulatory options for comment, and clarifying and correcting statements made in the November 3, 1987, Federal Register proposals.

II. Discussion

A. Proposed Total Coliform Rule

1. Update of Interim Rule (Option)

In addition to what was proposed, another option under consideration is to update the interim total coliform MCL (40 CFR 141.14). This standard consists of monthly and single sample MCL. This standard has been in place since 1975 and a number of comments favor not changing the rule. The minimum monitoring frequency under the interim rule is one sample per month or one sample per quarter for systems serving less than 1000 people if the system meets the criteria in 40 CFR 141.2.

The Agency requests comments on retaining the current coliform MCL with minor adjustments (e.g., updating analytical methods).

2. Number of Sampling Sites

The proposed total coliform rule would require that systems use at least three times as many sampling sites annually as the number of samples required to be taken monthly. The intent of the proposal was to prevent a system from repeatedly using the same small number of sampling sites to the exclusion of other sites in isolated parts of the distribution system. A number of commenters, primarily large systems, oppose this proposed requirement. The following reasons were given:

 It is difficult to sample in residential areas, and nonresidential locations are too few in number to meet the proposed

requirement.

 By requiring additional sampling sites, the proposed rule would reduce the number of samples collected at known trouble spots.

 The proposed rule would preclude systems from monitoring water quality at specific representative sites over time Thus, systems would lose historical data and trend information.

Several commenters offered alternative proposals for insuring that systems monitor all parts of the distribution system over time. These proposals included requiring a system to use: (1) At least the number of sampling sites annually as the number of samples required monthly; (2) at least one-half the number of sampling sites as the number of samples required monthly; (3) at least five sites/year; and (4) three times as many sampling sites annually as the number of samples required to be taken monthly (i.e., the proposed standard) but only if the system serves 3300 persons or fewer. One commenter suggested that the ratio of number of sites/year to the monthly monitoring frequency should be based upon population served, with larger systems being allowed to use a smaller ratio.

EPA still believes that it is important to require systems to monitor all parts of the distribution system over time, but recognizes that there may be practical difficulties associated with the proposed requirement. Therefore, EPA is requesting comment on an approach that would not specify the number of locations, but rather would require the

State to approve the sampling siting plan for each public water system within the State. To approve the plan, the State would have to find that it will ensure that the sampling is representative of the entire distribution system. The State would periodically review the sampling plan to insure that the locations are still representative. EPA is also soliciting comment on the four options mentioned above, and any other options that would ensure that systems sample representative sites in the distribution system.

3. Public Notification for a Single Fecal Coliform-Positive Sample

The proposed rule would require a system to test all total coliform-positive samples for fecal coliforms. If fecal coliforms were detected, this would be deemed an "acute violation" under the public notification rule (52 FR 41534, October 28, 1987); thus, the system would be required to notify the public of the violation via electronic media within 72 hours. A number of commenters opposed this proposed requirement; they gave the following reasons:

 Some fecal coliform-positive results are due to "false positives" (e.g., the presence of Klebsiella causes the positive result rather than E. coli), sample contamination, or poor laboratory procedure. Thus, all fecal coliform-positive results should be confirmed by another sample before notifying the public.

 Some large systems claim they commonly have several fecal coliformpositive samples each year without apparent health risk, and notifying the public of an acute health risk for every such sample might eventually cause indifference to such notices.

 When sampling, systems might intentionally bypass trouble spots to reduce the probability of finding fecal coliforms, if this proposal were in place.

 Only a small number of people may be affected, e.g., a single household in a metropolitan area. Notifying the entire community via electronic media for a localized problem would be inappropriate; those affected could be warned in a more direct manner without needlessly alarming the entire community.

 The proposed requirement is too inflexible. State and local authorities are in a good position to decide, after discussing the situation with the system, what precautions are necessary (e.g., issuing a boil water notice to a single neighborhood).

EPA still believes that fecal contamination in drinking water represents a significant health risk, but believes also that it is appropriate to

provide some latitude to the States for deciding what action is appropriate when a single fecal coliform-positive sample is found. EPA believes that States are generally in a position to judge whether electronic media notification is appropriate. Therefore, EPA is reconsidering its proposal to classify every fecal coliform-positive sample as an acute violation. The Agency requests comment on the following alternative requirement. When a system detects fecal coliforms in a routine water sample (after identifying a total coliform-positive sample), it would: (1) Immediately notify the appropriate State agency so the agency can determine whether the public should be notified and if so, by what means; and (2) take the required number of repeat samples at the same site where the fecal coliform were found, with the exception that some, but not all, of the repeat samples may be collected at the next adjacent service connection upstream or downstream from the one where the coliform-positive sample originated. If after a system detects fecal coliforms in a routine total coliform sample it also detects fecal coliforms in any repeat sample at that location or immediately adjacent service connection, the system would be out of compliance with the monthly MCL for total coliforms. This violation would be classified as acute and § 141.21(d) of the proposed rule would apply. Section 141.21(d) requires the system to: (1) Report the monthly MCL violation to the State within 48 hours of detection of fecal coliforms: and (2) Notify the public of the violation via the electronic media, as specified in § 141.32 of the public notification rule. The State could choose to require language in the public notice specifying the extent of the fecal contamination (e.g., system-wide or confined to a specific locale). EPA believes this option would allow verification of suspected contamination and give the State the necessary flexibility to tailor the response to site-specific circumstances.

On a related issue, in the November 3, 1987, proposal, EPA requested public comment on whether E. coli monitoring should be allowed in lieu of monitoring for fecal coliforms. Preliminary comments were favorable. Thus EPA is considering allowing a system with a total coliform-positive sample to test for either fecal coliforms or E. coli, for the reasons set out in the proposal. The same requirements would apply to either group of indicator organisms for determining whether a violation has occurred and public notification is required. EPA welcomes additional comments on this proposal.

4. Monitoring Frequency

The proposed rule would require State approval for a system serving 3300 persons or fewer to reduce total coliform monitoring to less than five samples/ month (see Table 1 of the proposed rule). The preamble to the proposed rule requested public comment on an alternative monitoring frequency for those ground-water systems that serve 500 persons or fewer (see 52 FR 42232, November 3, 1987). Under this approach, systems serving 500 persons or fewer would monitor at the lower monitoring frequency shown in Table 1 (52 FR 42243, November 3, 1987) of the proposed rule (i.e., one sample/month for systems using disinfected ground water; one sample/month for systems using undisinfected ground water which serve 25-300 persons, and three samples/month for systems using undisinfected ground water which serve 301-500 persons), unless the State deems it necessary to require more frequent monitoring.

Some commenters favor the alternative approach, primarily because it would reduce administrative costs for the State. The Agency is considering the adoption of this alternative in the final rule and is seeking additional public comment on it. In addition, EPA is considering broadening this alternative; the number of systems allowed to monitor fewer than five samples/month without initial State approval would be increased by including, in addition to ground-water systems that serve 500 persons or fewer, those systems serving 500 persons or fewer which use filtered surface water. EPA believes that most systems using filtered surface water would qualify for a monitoring frequency below the five samples/ month specified in Table 1 of the proposed rule. By permitting such systems to monitor at the lower frequency indicated in Table 1 (i.e., one sample/month) without initial State approval, the administrative burdens on the State would be reduced.

The Agency is also examining whether all systems using undisinfected ground water and serving 25–500 persons should be allowed to reduce monitoring to one sample/month, rather than to three samples/month for systems serving 301–500 persons, as specified in the proposed coliform rule (52 FR 42224). This monitoring frequency (which is the same as the current requirement for community water systems) would reduce the burden on States because they would not have to determine which of these systems would qualify for reduced monitoring, as

specified in the proposal. EPA believes this monitoring frequency could result in the same health protection for systems serving 301-500 persons, because these systems would be required to perform a periodic sanitary survey, and if the results are unsatisfactory, they would no longer be entitled to monitor at the lower frequency (i.e., once sample/month).

In response to some commenters, the Agency is also examining whether to retain the monitoring frequency scheme in the current rule (40 CFR 141.21 (b) and (c)). The monitoring frequencies under the current rule range from one sample/ month to 500 samples/ month, depending on the number of people served, for community public water systems, and one sample/quarter for non-community public water systems. The lower monitoring frequency in the current rule for many small systems, compared to the proposed rule, could prevent increased costs and still protect public health because of the added emphasis on sanitary surveys in the proposed coliform rule, the increased emphasis on treatment under the proposed surface water treatment requirements, and the forthcoming disinfection requirements for groundwater systems.

EPA is also considering an option which, regardless of the monitoring frequency scheme selected, would require a system collecting fewer than five samples/month to collect additional routine water samples for a period of time specified by EPA, whenever the system detects a total coliform-positive sample. This option, along with the proposed requirement for repeat samples, would allow the system to determine more quickly whether the drinking water was contaminated or not. Under this option, the Agency would specify the minimum number of additional routine samples a system would be required to collect.

EPA requests public comment on these issues.

5. Sanitary Surveys

EPA intends to promote the concept that a periodic comprehensive on-site evaluation (e.g., a sanitary survey) should be the basis for a variety of water quality and technology judgments that must be made in each water system. Thus, in this regulation, the Agency has proposed to require periodic on-site evaluations to determine appropriate monitoring requirements. This is not a new concept. Vulnerability assessments are already required by EPA's national primary drinking water regulations for volatile organic chemicals (VOCs) (52 FR 25690, July 8,

1987) for systems which want to reduce VOC monitoring. The assessments must be repeated every three years (or every five years for systems with fewer than 500 service connections). Also, the proposed surface water treatment requirements would require unfiltered surface water systems to conduct a sanitary survey once a year and obtain acceptable results (among other requirements) to avoid filtration. In addition, EPA intends to promulgate disinfection requirements for groundwater systems, including criteria for obtaining variances. One of the anticipated criteria for obtaining a variance would be a sanitary survey with satisfactory results. Because of these related requirements, which are summarized in Table 1, if a single sanitary survey is conducted periodically to address a variety of regulatory requirements, the incremental cost to satisfy each different regulatory requirement would be minimized. Under such a framework, EPA believes it would not be burdensome to require systems to conduct sanitary surveys at a specified frequency. EPA may base the frequency of this periodic comprehensive, multipurpose sanitary survey on system size or system type (i.e., community or noncommunity system).

TABLE 1.—FREQUENCY OR PROPOSED FREQUENCY FOR SANITARY SURVEYS/ VULNERABILITY ASSESSMENTS

| Rule | No. systems affected | Frequency of sanitary survey/ vulnerability assessment (in years) |
|---------------------------------------|-------------------------|---|
| Volatile organic | 419 62 | |
| chemicals: ≥500 connections | Up to 21,000 | 2 |
| < 500 connections | Up to 33,500 | |
| Coliforms: | Op 10 00,000 | |
| Surface water | 10,000 | 3-5 |
| Ground water | 190,000 | 3-5 |
| Surface water treatment requirements. | 450 | Annual. |
| Groundwater | 190,000 | ? |
| disinfection. | | |
| Other future regulations. | ? | 7 |

Statutory authority for requiring a periodic on-site sanitary survey is found in sections 1401(1)(D) and 1413(a)(2) of the Safe Drinking Water Act. Section 1401(1)(D) states that the term "primary drinking water regulation" means a regulation which "contains criteria and procedures to assure a supply of drinking water which dependably

complies with * * * maximum contaminant levels; including quality control and testing procedures to insure compliance with such levels and to insure proper operation and maintenance of the system, and requirements as to (1) the minimum quality of water which may be taken into the system * * *." Section 1413(a)(2) states that to obtain primary enforcement responsibility a State must adopt drinking water regulations and must adopt and implement "adequate procedures for the enforcement of * * * State [drinking water] regulations, including conducting such monitoring and making such inspections as the Administrator may require by regulation."

As described in more detail in the previous section, systems serving 500 persons or fewer would be allowed to monitor at the lower monitoring frequency in Table 1 of the proposed rule without initial State approval, as long as they perform sanitary surveys at the frequency specified in Table 1. In order to clarify the role of the sanitary survey under this alternative approach for setting the monitoring frequency, EPA is considering requiring each system serving 500 persons or fewer which collects fewer than five samples/ month to complete an initial sanitary survey within a reasonable time period from the effective date of the final rule. EPA is considering at least two options for defining what constitutes a "reasonable" time period. Under the first option, EPA would not specify a date by which this survey and analysis of results must be accomplished. Under the second option, EPA would specify a

specific date, perhaps two years after

the effective date of the final rule.

Under either option, EPA is further considering requiring systems serving 500 persons or fewer which collect fewer than five samples/month to conduct subsequent sanitary surveys as follows: Systems which use ground water and disinfect or which use surface water and practice filtration and disinfection would be required to conduct a sanitary survey every five years; systems which use undisinfected ground water would be required to conduct a sanitary survey every three years; and systems which use unfiltered surface water would be required to conduct sanitary surveys annually. These sanitary survey frequencies are identical to those in Table 1 of the proposed rule, except in the case of systems which use surface water and do not practice filtration. In this case, EPA believes that an annual sanitary survey is necessary because of the relatively

greater potential health risk of using unfiltered surface water versus filtered surface water or ground water.

EPA solicits public comment on: (1)
The length of time EPA should specify
for the completion of all initial sanitary
surveys; and (2) whether this initial time
period or the time period between
subsequent sanitary surveys should
depend on system size or system type.

6. Number of Repeat Samples

The proposed rule would require each public water system to collect five repeat samples for each coliformpositive sample (under the current total coliform rule, when a coliform-positive sample is found, the system must collect daily check samples until coliforms are not detected in two consecutive samples). For systems serving 3,300 persons or fewer, the rationale for requiring five repeat samples is that under the proposal, systems permitted to reduce their regular monitoring frequency below five samples/month are allowed to do so on the basis that they would perform a periodic sanitary survey and the results would be satisfactory. The finding of a coliformpositive sample in a system that had qualified for less frequent monitoring might call that conclusion into question. In the case of a coliform-positive sample, repeat samples would allow a system to determine quickly whether a serious contamination problem exists, and if coliforms were not detected in these samples, would provide confidence that only a small percentage of its samples are coliform-positive. For a system that collects five or more samples/month, the five repeat samples would allow that system to determine quickly the severity of a local contamination problem. More repeat samples would increase the probability of detecting coliforms.

Some commenters stated that five repeat samples is an unnecessarily rigid requirement that would pose too great a financial burden to many systems. Some of these commenters thought that two repeat samples, as specified in the current rule, are adequate. EPA believes that the financial burden posed by five repeat samples would be amelioraled by the provisions in the proposed rule specifying that: (1) All repeat samples would be collected on the same day during a single trip as opposed to the current requirement which requires at least two daily trips to collect two different repeat samples; and (2) Repeat samples would be counted as part of the minimum monthly monitoring requirements, which the system must take anyway. Nevertheless, EPA is

reexamining what the most appropriate number of repeat samples should be.

One alternative to the proposal (i.e., five repeat samples) would be to require only four repeat samples for those systems which collect fewer than five coliform samples/month. The rationale for this requirement would be that systems which monitor fewer than five times/month would be allowed to do so only if they could demonstrate that their drinking water is safe, as indicated by a periodic sanitary survey. If coliforms were detected in a sample, this assumption would be suspect and the system should be required, at least for that month, to revert to sampling at the higher baseline of at least five samples/ month. For a system which collects fewer than five samples/month, the four repeat samples would bring the total number of samples for the month at least to the higher baseline. For systems which collect five or more samples/ month, the four repeat samples would allow them to determine quickly the extent of local contamination.

Another option is to require systems which collect fewer than five samples/month to collect four repeat samples when a coliform-positive sample is found, as above, but allow systems which collect five or more samples/month to collect two repeat samples, rather than four. The rationale for fewer repeat samples is that systems collecting a larger number of routine samples (i.e., five or more samples/month) are more likely to detect contamination than a system collecting fewer samples, and thus fewer repeat samples are necessary.

Finally, another alternative to the proposal would be to require a minimum of two repeat samples per coliformpositive sample for all systems. States could increase the number of repeat samples, as necessary, on a case-bycase basis. The advantage of this requirement is that it is similar to the current requirement (i.e., a repeat sample on each of two consecutive days) and thus would require little readjustment by systems. Also, this requirement would be less costly. A variation of this proposal would be to require two repeat samples of 250 ml each, which would result in examination of the same volume of water as five 100ml repeat samples. EPA is also considering requiring two repeat sample volumes of 200 ml or 300 ml to allow systems to use even multiples of the standard 100-ml sample bottles.

The Agency requests public comment on the appropriate number of repeat samples, the volumes of each repeat sample and the rationale for the recommendation. EPA also requests that commenters provide any data which would indicate the increase in costs, especially for a small system, posed by the proposed requirement for five repeat samples.

7. Long-term MCL

Some commenters have indicated that States might have difficulty keeping track of compliance with the proposed long-term MCL. The primary rationale for the proposed long-term MCL is to insure that intermittent (as opposed to continuous) contamination is controlled. A shortcoming of the current coliform rule is that it fails to address this problem. Under the November 3, 1987, proposal, without the proposed longterm MCL, a system collecting one sample/month could regularly have total coliforms in 20 percent of its samples month after month (assuming that the system finding a coliform-positive sample then collects four repeat samples, as specified in the proposal, and each is coliform-negative), and still be in compliance with the proposed monthly coliform MCL, even though the system is obviously subject to intermittent contamination. For this reason, the Agency believes that some limit should be placed on the percentage or number of samples over time which are coliform-positive. This is the purpose of the long-term MCL.

One alternative to the proposed longterm MCL for systems which collect fewer than 60 samples/year would be to define non-compliance with the longterm MCL as follows: Noncompliance occurs when in any four or more months out of a consecutive 12-month period, a system detects coliforms in more than five percent of its monthly samples. In this way, States would not have to track systems for more than one year. Many noncommunity systems, however, do not provide water more than three months of the year, and thus might never violate this alternative long-term MCL, even though intermittent contamination may exist. For this reason, EPA is considering another alternative, at least for non-community systems which collect fewer than 60 samples/year. Under this option, a system would violate the long-term MCL if more than three samples in 12 consecutive calendar months were coliform-positive. For systems which collect fewer than 60 samples/year, three coliform-positive samples are five percent of 60 samples. Therefore, in this instance, if a system draws four or more coliform-positive samples it is in violation of the proposed long-term MCL, which is based on 60 samples.

EPA is also examining another alternative which would define a violation of the long-term MCL as occurring when a system detects coliforms in more than five percent of the samples collected during a month, unless the system can demonstrate that no more than five percent of its most recent 60 samples were total coliform-positive. Under this alternative, the proposed follow-up actions to a coliform-positive sample (e.g., repeat samples and fecal coliform determinations) would still apply.

Another option would be to delete the proposed long-term MCL, but require States to choose from a list of EPA-approved actions (e.g., perform a sanitary survey, require system to issue a boil water notice, require system to disinfect continuously), whenever the number of total coliform-positive samples from a system exceeds five percent of the total number of samples during an EPA-specified time period (e.g., most recent 12 months).

EPA seeks public comment on these alternative approaches, and requests other reasonable ideas for identifying intermittent contamination.

8. Analytical methods for coliforms

The proposed coliform rule, in § 141.21(b), would approve three analytical methods for detection of total coliforms. Since the proposal, EPA has been evaluating additional methods for possible approval, including the "Colilert" system (unpublished). In this notice, EPA is proposing to approve the Autoanalysis Colilert system for total coliform analysis, in addition to the previously proposed Membrane Filter (MF) Technique, Multiple-Tube Fermentation (MTF) Technique, and the Presence-Absence Coliform (P-A) Test.

The Autoanalysis Colilert test represents a technology transfer from clinical microbiology, and is based on the ability of coliforms to produce the enzyme b-galactosidase to hydrolyze onitrophenyl-b-D-galactopyranoside and produce a yellow color. The test formulation does not support the growth of non-coliform organisms. In addition, the enzyme b-glucuronidase produced by E. coli forms a fluorescent substance when it hydrolyzes 4-methylumbilliferylb-D-glucuronide (MUG). The combination of these two substrates in a single formula allows detection and confirmation of both total coliforms and E. coli within 24 hours. The test is simple; it requires the addition of measured amounts of water to a powdered medium, incubation, and observation of a yellow color if total coliforms are present. If the yellow tubes are subjected to ultraviolet light

(366 nm), and E. coli are present, the tubes will fluoresce.

EPA and the American Water Works Association Research Foundation supported an extensive field evaluation that compared recoveries of total coliforms by the MF method, 5- and 10tube MTF method, the P-A test, and the Autoanalysis Colilert system as a 10tube test for coliform density and as a 100-ml test for the presence or absence of coliforms. Statistical analyses showed either no significant difference or slightly higher coliform-positive results with the Autoanalysis Colilert system than the MTF technique. The Autoanalysis Colilert system was significantly more precise than the MTF technique at two of the five test sites and equivalent to the MTF technique at the remaining three sites. When recoveries using the P-A test and the Colilert system were compared, the results were equivalent 95 percent of the time. Recoveries using the MF technique and the Colilert system were also equivalent. These data have not as vet been published, but the study report has been placed in the coliform docket for the proposed rule.

EPA is also proposing to approve the Autoanalysis Colilert system for analyzing samples taken to comply with the current coliform rule as a five-tube quantitation method; the Agency believes the data demonstrate that this method is at least as good as the currently approved methods and its use should not be delayed until the effective date of the final revised coliform rule.

The Agency requests public comment and data on the effectiveness and practicality of this new analytical procedure and of any other procedures which detect total coliforms, and any data indicating that any procedures proposed should not be approved.

9. Clarifications and corrections to the proposed coliform rule

(i) Section 141.21[a](5) of the proposed rule states that public water systems that do not provide water year-round need only collect samples each month that the system provides water to the public, and that such systems must monitor as specified in Tables 1 and 2, using the estimated population, including transients, served during that month. For the purposes of this rulemaking, estimated population during the month is proposed to be defined as the average daily population during the month, not the total monthly population.

(ii) Section 141.21(f) (1) and (2) of the proposed rule defines potential interference with the analysis for total coliforms by high levels of heterotrophic bacteria. To clarify § 141.21(f)(1),

interference should be reported if a turbid culture appears in *one or more* tubes in the absence of gas production, using the multiple tube fermentation technique.

[iii) Section 141.63(2)(iv) of the proposed rule should read, "Public water systems which have violated the long-term MCL remain in noncompliance until coliforms are not detected in more than five percent of the most recent 20 or more samples."

(iv) Section 142.16 of the proposed rule should be titled, "Special primacy requirements."

(v) Table 1 of the proposed rule identifies three population categories: 25–500 persons, 501–3,300 persons, and over 3,300 persons. For the purposes of this rule, public water systems serving fewer than 25 persons, but having at least 15 service connections, would be included in the 25–500 person category.

B. Proposed Surface Water Treatment Requirements

Disinfection Residual in the Distribution System

The proposed rule would require that all surface water systems measure and record the disinfectant residual in the distribution system at the same frequency and locations as required for total coliform measurements under the proposed total coliform rule. The purpose of this requirement is to: (1) Ensure that the distribution system is properly maintained and identify and limit contamination from outside the distribution system; (2) limit the growth of heterotrophic plate count bacteria (HPC) and Legionella within the distribution system; and (3) provide a minimum target which, if exceeded, would trigger remedial action. Under the proposed rule, disinfectant residuals could not be less than 0.2 mg/l at any location in the system in more than five percent of the samples in a month, for any two consecutive months, on an ongoing basis. Failure to meet this requirement would constitute a Tier 1 (non-acute) violation of a treatment technique requirement, as defined in the revised public notification requirements in § 141.32(a), and thus would require the system to notify the public by newspaper, posting, or hand delivery within 14 days following the violation, as specified in the revised public notification rule. The basis for these proposed requirements is given in the preamble to the proposed rule (52 FR 42199, November 3, 1987).

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Commenters made the following observations pertaining to this requirement:

 Many systems which have microbiologically safe water in the distribution system would not be able to meet this criterion.

 Achieving compliance with this requirement by increasing the levels of free chlorine in the distribution system might increase exposure to disinfectant by-products and/or result in violations of current or future total trihalomethane and other disinfectant by-product regulations.

• There is no evidence of any benefit in maintaining disinfectant residuals of

0.2 mg/l or greater.

 If disinfectant residuals are required, the requirements should be different for different disinfectants because they vary in effectiveness.

Commenters proposed the following

alternatives to address the issues they raised: (1) Delete any disinfectant residual requirements for distribution systems from this rule, postponing the determination of appropriate requirements, if any, until the disinfection by-products rulemaking (scheduled for promulgation by January 1991); (2) Maintain the proposed criterion but, in lieu of requiring residuals of at least 0.2 mg/l, simply require residuals to be "detectable" or "measurable"; (3) Maintain the proposed criterion but allow systems to measure for HPC using the standard pour plate method at sites with residuals of less than 0.2 mg/l and, if the HPC measurement is less than 500/ml, consider the site as having met the residual requirements; and (4) A combination of (2) and (3), i.e., maintain the proposed criterion but require 'detectable' residuals in lieu of residuals of at least 0.2 mg/l, and consider sites that do not have "detectable" residuals but have HPC measurements of less than 500/ml to be equivalent to sites with "detectable" residuals for purposes of determining compliance. EPA is considering adoption of the last alternative described above because the Agency believes this option would fulfill the same objectives as the requirements in the proposed rule (as set out above). Under the alternative option, EPA believes the potential conflict between this requirement and any future regulations to control disinfectant residuals and disinfectant by-products. and cost impacts resulting from changes in disinfection practice to meet these requirements, would be minimized.

EPA would like to receive additional comments on the appropriateness of the proposed alternative, as well as the other options described above. EPA specifically solicits comments on the following issues: What data are

available to indicate that "detectable" total chlorine, free chlorine, chloramine, or chlorine dioxide residuals would inhibit growth of HPC in the distribution system? Would small systems be expected to have difficulty in meeting the November 3, 1987, proposed requirements? Since HPC samples must be analyzed within eight hours and inhouse monitoring capability for small systems is generally not expected to be available, would the option of measuring HPC at sites where residuals were less than 0.2 mg/l (or not "detectable") be feasible for small systems? If not, what options should be allowed for small systems?

As noted above, the proposed rule would require that all surface water systems measure the disinfectant residual in the distribution system at the same frequency and locations as required for total coliforms under the proposed total coliform rule. If the monitoring requirements for total coliforms in the distribution system are changed in the final rule from what was proposed, is it appropriate to also change the requirements for monitoring the disinfectant residual in the distribution system? In other words, should the requirements for monitoring disinfectant residual in the distribution system coincide with the monitoring requirements for total coliforms in the final total coliform rule? If not, what monitoring requirements for disinfectant residuals would be appropriate?

2. Continuous Disinfection Residual at the Entry Point to the Distribution System

The proposed rule would require that all surface water systems continuously monitor the disinfectant residual entering the distribution system in order to assure a continuous treatment barrier of protection from pathogenic organisms. Each system would be required to record the lowest disinfectant residual concentration entering the distribution system each day; any time the residual was less than 0.2 mg/l would be considered an "acute" violation of a treatment technique requirement for purposes of public notification (see § 141.32(a)(iii)). Thus, as specified in the revised public notification rule, a system that has such a violation would be required to notify the public of the violation within 72 hours via electronic media, as well as comply with the public notification requirements for all Tier 1 violations (which include treatment technique violations).

Commenters made the following points regarding this requirement:

 The cost for very small systems to install continuous monitoring equipment is excessive (cited as about \$5,000 for one analyzer and continuous recorder; with another unit as a backup, the capital costs would be \$10,000).

 The short-term absence of a disinfectant residual at the entry point to the distribution system should not automatically trigger immediate public notification via electronic media since the actual health risks, which would depend upon site-specific

circumstances, may not be significant.

Based on these comments, EPA is proposing to: (1) Allow systems serving less than 500 people to collect and analyze one grab sample of disinfectant residual each day in lieu of continuous monitoring; (2) Require systems serving less than 500 people that only analyze one grab sample each day to collect and analyze another disinfectant residual measurement within four hours of any measurement which is less than 0.2 mg/l (or does not have a "detectable" disinfectant residual, as described in the previous section); (3) Require all systems, regardless of system size, to notify the State immediately when the residual concentration is less than 0.2 mg/l (or, alternatively, when there is no "detectable" residual concentration in the water) regardless of whether or not the residual concentration is restored within four hours; and (4) Define a violation of this particular requirement as a violation of a treatment technique requirement, i.e., Tier 1, but not acute, for purposes of public notification, if within 4 hours the residual remains less than 0.2 mg/l (or, alternatively, a "detectable" residual concentration has not been restored within 4 hours). EPA believes these changes would reduce the cost burden, especially for small systems, and avoid unnecessary public notification, and still ensure that any significant lapse in disinfection would be detected.

EPA solicits comments on these suggested changes to the November 3, 1987, proposed rule. Also, if the final rule requires a "detectable" residual in lieu of a residual of 0.2 mg/l in the distribution system, should the requirement for the water entering the distribution system also be the presence of a "detectable" residual? Should another cutoff point (e.g., 500 service connections or 3300) be used for determining when daily grab sample monitoring could be used in lieu of continuous monitoring? In addition, as an added measure of protection, should total coliform measurements be required at the point of entry to or in the distribution system when the system

fails to maintain the required disinfectant residual? If so, what action should be taken if such samples are coliform-positive?

3. Turbidity Monitoring and Performance Criteria

Under the proposed rule, systems which use conventional treatment or direct filtration would be required to monitor the turbidity of a representative sample of filtered water with one grab sample every four hours when water is being delivered to the distribution system. The system could substitute continuous monitoring for grab sampling, upon State approval, and use the turbidity value for every four hours to determine compliance with the turbidity performance criterion. Under the proposed rule, for a system using conventional treatment or direct filtration, the turbidity level of the system's filtered water must be less than or equal to 0.5 NTU in at least 95 percent of the measurements taken each month. For a system using slow sand or diatomaceous earth filtration, the turbidity level must be less than 1 NTU in at least 95 percent of the measurements taken each month. If the State determined that on-site studies demonstrate at least 99.9 percent overall removal/inactivation of Giardia cysts. the State could specify a higher performance standard, up to 1 NTU in 95 percent of the samples in a month. The basis for the proposed turbidity monitoring and performance criteria was explained in the preamble to the proposed rule (52 FR 42200, November 3, 1987).

Commenters raised the following issues pertaining to this criterion:

 Monitoring of turbidity either every four hours, or by continuous monitoring and recording equipment, is not feasible for small systems.

 The same turbidity performance criteria should apply to all technologies because the same water quality should

be required for all systems.

 There is no evidence of significant increased health protection, in terms of avoiding waterborne disease outbreaks, under the criteria of the proposed rule versus the existing (less stringent) turbidity MCL.

 Many systems, especially smaller systems, would incur significant costs to make treatment changes to comply with

the proposed criteria.

For systems serving less than 500 people, EPA is considering allowing the State to reduce the monitoring to one grab sample per day, if the historical performance and operation of the system indicate effective turbidity removal under the variety of conditions

expected to occur in that system. EPA believes the provision for reduced monitoring is appropriate because, for very small systems, grab sample monitoring every four hours of operation is not feasible, and automated turbidity monitoring equipment is costly to purchase and maintain. At the reduced monitoring frequency, the same performance criteria would apply. Thus, if two out of 30 samples taken in one month exceed the turbidity limit, then less than 95 percent of the samples would meet the turbidity performance criterion, and the system would be in violation of a treatment technique requirement (however, this would not be considered an acute violation under the revised public notification requirements). EPA solicits comments on this suggested change to the November 1987 proposed rule.

EPA believes that it is feasible for most systems using conventional treatment or direct filtration to achieve the turbidity performance criterion of 0.5 NTU (see 52 FR 42200, 42205-42206), and that this turbidity level is generally necessary to achieve at least 99 percent removal of Giardia cysts under all conditions of raw water quality. In addition, EPA believes it is generally necessary for systems using conventional treatment or direct filtration to meet the proposed turbidity limit in order to achieve at least 99.9 percent removal/inactivation of Giardia cysts with filtration and disinfection. EPA recognizes that many existing filtered systems may currently not be meeting the proposed turbidity limit; however, EPA believes that most of these systems would be able to meet the proposed limits with treatment modifications that involve very low

EPA recognizes that it may be possible for some systems that are not meeting the proposed turbidity performance criteria, depending upon raw water quality and other treatment characteristics, to achieve the overall minimum (or better) removal and/or inactivation of Giardia cysts. Therefore, the proposal allows for the State to specify higher turbidity performance criteria up to 1 NTU if the system can demonstrate to the State that it is achieving at least 99.9 percent removal/ inactivation of Giardia cysts by filtration and disinfection. EPA has developed draft guidelines for making such determinations in the October 8, 1987, "Draft Guidance Manual for Compliance With the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources" ("draft Guidance Manual"). One of the recommended approaches in

costs (see Table VII-3, 52 FR 42206).

the draft Guidance Manual is to determine, by pilot plant studies, the percent removal of particles equivalent in size to Giardia cysts and to combine this with the percent inactivation of Giardia cysts achieved by disinfection. as determined from CT values (the CT value is the product of residual disinfectant concentration "C" in mg/l and the disinfectant contact time "T" in minutes) to determine the overall removal and/or inactivation. The proposal would also allow for demonstrations for one system to apply to another system with the same design and operating conditions and similar source water quality. EPA is considering modifying the

November 1987 proposed criteria to

allow the State to determine whether the system is achieving the minimum performance requirement of 99.9 percent removal/inactivation of Giardia cysts at filtered turbidities up to no more than 1 NTU 95 percent of the time, without any required showing by the system (e.g., pilot plant study results). Such a determination could be based upon an analysis of existing design and operating conditions (e.g., adequacy of treatment prior to filtration, percent turbidity removal across the entire treatment chain, and stringency of disinfection). and/or performance relative to certain water quality characteristics (e.g. microbiological analysis of the filtered water, and particle size counting before and after the filter). Under this option, the State could consider such factors as source water quality and system size in

determining the extent of analysis

provide additional guidance to the

States for determining when higher

allowed.

necessary (e.g., whether a pilot plant

demonstration would be needed). In the

final Guidance Manual, EPA intends to

turbidity performance criteria could be

Also, EPA notes that Section 1416 of the SDWA allows States to grant oneyear exemptions to systems which cannot meet the treatment requirements in the time specified due to "compelling factors" (which may include economic factors) if they determine that the exemption would not result in an unreasonable risk to health. The initial one-year exemptions may be extended for up to three additional years if certain requirements are met. Systems with 500 or fewer service connections are eligible for additional two-year extensions of the exemptions if the system is taking all practicable steps to meet the standard. (See Section 1416 of the Safe Drinking Water Act for a more complete description of the standards for exemptions.)

EPA solicits information on the following issues related to the proposed turbidity performance criteria: What criteria should be used to allow systems to exceed the turbidity limit of 0.5 NTU? What treatment modifications have systems attempted that still result in failure to meet the proposed turbidity performance criteria? Do source water conditions exist that make it unreasonable to expect certain systems to achieve filtered water turbidities of less than 0.5 NTU? Should another cutoff point (e.g., 500 service connections) be used for determining when once a day grab sample monitoring for tubidity might be appropriate? Are data available that indicate effective Giardia cyst removal at higher turbidity limits than those which have been proposed? Are EPA's estimated costs for systems to upgrade to meet the proposed turbidity performance criteria reasonable (see Table VII-3, 52 FR 42206)? In responding to this last question, EPA would especially appreciate detailed system level costs where all assumptions are explicit and total costs are reported in cents per 1000 gallons of water produced.

4. CT Values

To avoid filtration, the proposed rule would require surface water systems to disinfect and to achieve at least 99.9 percent and 99.99 percent inactivation of Ciardia lamblia cysts and enteric viruses, respectively, as determined by CT values. The proposed rule would require filtered systems to disinfect, and for the overall treatment (i.e., filtration and disinfection) to achieve at least 99.9 percent removal/inactivation and 99.99 percent removal/inactivation of Giardia cysts and enteric viruses, respectively. The State would determine whether the system complies with the overall treatment performance requirement for Giardia lamblia cysts and enteric viruses. In the draft Guidance Manual, EPA recommends that, in general, filtration (with any pretreatment appropriate for the specific technology used) should be assumed to achieve at least 99 percent removal of Giardia lamblia cysts and 90 percent removal of enteric viruses. Therefore, in order for a system which is filtering to achieve at least 99.9 percent and 99.99 percent removal/inactivation of Giardia lamblia cysts and enteric viruses, respectively, the system should provide disinfection which achieves at least a 90 percent inactivation of Giardia lamblia cysts. With the possible exception of chloramines, CT values which achieve greater than a 50 percent inactivation of Giardia lamblia cysts would be expected to achieve greater than a 99.99

percent inactivation of enteric viruses; thus, a system which achieves greater than 50 percent inactivation of *Giardia* lamblia cysts would also satisfy the overall minimum performance requirement for enteric viruses.

EPA received the following comments about the CT values presented in the

proposal:

The data base used to establish CT values is not substantial.

 The proposed safety factors associated with the CT values are excessive.

 The proposed CT values are based on laboratory data which might not reflect field conditions.

 The methods prescribed in the proposed rule and draft Guidance Manual for calculating "C" and "T" to determine "CT" are overly conservative

determine "CT" are overly conservative.

• For filtered systems, the guidelines restricting predisinfection credit to water with low turbidity is unwarranted.

 The methods prescribed in the proposed rule and Guidance Manual for calculating ozone CT values are not reasonable given the nature of its rapid decomposition in water and the nature of its application in contact basins.

• The CT values for ozone in the proposed rule were based upon ozone measurement using the Idiometric method which measures ozone and free radicals, whereas the proposed rule would require systems to measure ozone using the Indigo method (which only measures ozone residuals). EPA should allow the Idiometric method to be used for measuring ozone residuals to determine "C."

 More flexibility is needed for demonstrating that chloramines are an adequate primary disinfectant when long contact times are used.

In sum, many industry commenters claim that most filtered systems would not be able to achieve the percent inactivations recommended in the Guidance Manual using their current disinfection practice. These commenters further claim that since there is no evidence of waterborne disease associated with current conventional treatment systems that are properly operated, the CT values recommended in the draft Guidance Manual are not justified. In addition, some commenters claim that the same argument applies to many unfiltered supplies.

EPA is considering all of the above issues and comments in the development of the final rule and final Guidance Manual. Specifically, the Agency is currently reevaluating the basis for the CT values in the November 3, 1987, proposed rule and in the draft Guidance Manual. As a result of this

analysis, which is not yet complete, the CT values in the final rule and final Guidance Manual may change from those which were proposed. EPA solicits comment on the rationale that should be used for determining appropriate CT values and methods for their calculation.

In addition, based on analysis of existing data and comments received to date, EPA is considering adopting certain changes to the proposed rule and draft Guidance Manual regarding the determination of CT values by public water systems. EPA solicits comment on these changes, which are described below:

 Calculation of CT values for ozone. Under the proposed rule, systems without filtration would be required to calculate CT values for ozone using the same methodology as for other disinfectants, i.e., the ozone concentration would be measured at some point prior to the application of any other disinfectant. Because ozone is highly reactive and dissipates quickly. measuring ozone at the effluent downstream of the contact basin, as specified in the proposal, could grossly underestimate or overestimate (in the case of a counter current reactor) the actual CT value. Thus, EPA is now considering allowing the State to determine on a case-by-case basis, for each system using ozone, how ozone concentrations should be measured for the purpose of calculating whether the CT values in the rule have been met. EPA would recommend in the final Guidance Manual how "C" and "T" should be determined for the purpose of obtaining a CT value. In principal, EPA intends to revise the draft Guidance Manual to recommend that the system determine, during peak hourly flow, the profile of ozone concentration across the contact basin, or each contact basin in the case of multiple stage reactors, and use the average concentration in lieu of the effluent concentrations to determine "C." The average concentration, "C, could be calculated across any reactor in which there was a measureable concentration of ozone in the effluent (or influent in the case of a counter current reactor). This approach would provide a more representative measurement of ozone. This guidance would also apply to filtered systems using ozone for determining their CT values. EPA still intends to require that ozone residual be measured using the Indigo method; however, EPA is considering lowering the proposed CT values for ozone since they were originally based upon measurements using the Idiometric method.

According to the draft Guidance Manual, within the contact basin, "T" should be based upon the time it would take the tracer concentration in the effluent to reach 10 percent of the tracer concentration in the influent (i.e., the T10 value) during peak hourly flow. Commenters have suggested that this is unrealistic, especially for ozone applied in a contact basin, which simulates a completely mixed reactor. Some commenters have suggested that the Tso value during peak hourly flow, rather than the T10 value, be used in the CT calculation. EPA has concerns about adopting such a guideline for ozone (or for other disinfectants) because at the T50 value, only 50 percent of the water is receiving the contact time necessary to meet the designated CT value (versus 90 percent of the water receiving the contact time to meet the designated CT value if the T10 value were used). EPA solicits additional comments on this particular issue. Should another methodology be used for determining "T" in ozone reactors? Is it appropriate to allow use of T50 for CT determinations for ozone versus T10 for CT values for other disinfectants, given that the CT values in the rule for ozone. extrapolated from laboratory data, are based upon a much larger safety factor than are the CT values for chlorine? If the revised method for calculating "C" and the procedure for determining "T" (i.e., using the T10 value) were adopted, are the proposed CT values for ozone in unfiltered supplies in the November 1987 proposed rule, and the recommended CT values for filtered water supplies in the draft Guidance Manual, feasible for systems to achieve?

b. Chloramines. Under the proposed rule, unfiltered supplies using chloramines could demonstrate, through the use of a State-approved protocol for on-site disinfection challenge studies, that lower CT values than those indicated in the rule achieve the required percent inactivation. This provision is included for chloramines, but not for other disinfectants, because chloramination, as conducted in the field, is more effective than using preformed chloramines. (The CT values in the rule are based on laboratory data using preformed chloramines.)

The draft Guidance Manual recommends that animal infectivity studies be used to determine the CT values necessary to achieve 99.9 percent inactivation of Giardia cysts and that the MS₂ bacteriophage be used as an indicator to determine CT values necessary to achieve 99.99 percent inactivation of enteric viruses. EPA believes that other methodologies also

may be appropriate. In the final Guidance Manual, EPA intends to recommend that the procedure for evaluating disinfection efficiency of Giardia cyst inactivation using excystation, discussed by Hoff, et al., 1985, be allowed to determine CT values for achieving up to 99 percent inactivation of Giardia cysts using chloramines. EPA intends to recommend that CT99.9 values (CT values necessary to achieve 99.9 percent inactivation) be estimated based upon multiplying CT99 values, determined using excystation, by two; CT99.9 values cannot be directly determined using excystation because of the constraints of the methodology. Multiplication by the factor of two, rather than 1.5, provides a margin of safety more conservative than the assumption of direct extrapolation using first order kinetics. In the final Guidance Manual, EPA also intends to recommend that Giardia muris cysts be allowed to be used as a model for Giardia lamblia cysts using excystation, since results of disinfection experiments using excystation to measure viability consistently indicate that Giardia muris cysts, which apparently are not pathogenic to humans, are more resistant to inactivation than Giardia lamblia cysts. The final Guidance Manual would also recommend use of excystation, as described by Hoff, et al., 1985, to determine percent Giardia cyst inactivation in filtered systems to demonstrate the effectiveness of chloramines as a primary disinfectant (e.g., 90, 95, or 99 percent inactivation, as needed). EPA intends to conduct a workshop in 1988 to demonstrate how excystation can be used for determining CT values for systems using chloramines. EPA also intends to recommend in the final Guidance Manual that systems using chloramines for primary disinfection be required by the State to monitor the water entering the distribution system on a regular basis for HPC and, in general, maintain levels of less than ten organisms/ml using the standard pour plate procedure. According to Geldreich, et al. (1987), HPC is a good overall indicator of treatment efficiency and the density of heterotrophic bacteria in the plant effluent can easily be maintained at less than ten organisms/ml.

EPA solicts comment on the above criteria. EPA also requests comment on whether other methodologies or performance criteria would be appropriate for determining whether chloramines should be allowed as a primary disinfectant.

 c. Predisinfection credit. In the draft Guidance Manual, EPA recommends

that, in filtered water supplies, disinfection credit toward Giardia and virus inactivation only be allowed if the turbidity in the water is less than 5 NTU and 1 NTU, respectively. EPA intends to delete this recommendation and allow credit for disinfection of Giardia and viruses prior to filtration, regardless of the turbidity level, because EPA believes it is reasonable to assume that any pathogens present in the water would either be removed along with the turbidity removed by filtration, or be directly exposed to disinfection. The time of exposure (i.e., the "T" disinfectant contact time, in "CT"), type of disinfectant, disinfectant concentration, and the pH and temperature of the water would determine the amount of inactivation that is achieved. Percent inactivation achieved by disinfection for each unit process prior to filtration would be based upon CT values, where "C" is measured at the end of each unit process (with the exception of ozone, as previously described), and "T," as determined by tracer studies, is measured across each unit process.

d. Other issues. In the November 1987 proposal, EPA solicited comment on the appropriateness of various criteria specifically related to the "CT" concept in the proposed rule and the draft Guidance Manual (52 FR 42209). EPA would like to receive additional comments on the following questions.

Are the recommended general guidelines that filtration can be assumed to achieve at least a 99 percent removal of Giardia, and that such systems should achieve at least 90 percent inactivation of Giardia by disinfection, in order to satisfy the overall 99.9 percent removal/inactivation requirement, appropriate? Under what circumstances should systems which achieve less than 90 percent inactivation by disinfection be considered to achieve the overall removal/inactivation requirement of 99.9 percent for Giardia cysts? What data are available to indicate disinfection efficiencies for Giardia cyst and enteric virus inactivation at high pH conditions encountered in such unit processes as lime softening? What data are available to indicate that systems are meeting the overall minimum performance requirements (99.9/99.99 percent removal/inactivation of Giardia and viruses) without meeting the proposed minimum turbidity criteria and/or CT values?

The draft Guidance Manual suggests that systems using conventional treatment or slow sand filtration, with source water low in total coliform concentrations, might in some circumstances be allowed to achieve as little as 50 percent inactivation of *Ciardia* cysts (which is also considered to achieve greater than a 99.99 percent inactivation of enteric viruses), and still be considered as meeting the overall minimum performance criteria. Are such guidelines appropriate?

Should CT values for unfiltered systems be included in the Guidance Manual rather than in the rule? One of the major reasons why EPA included CT values for unfiltered systems in the proposed rule was to make the determination of whether filtration should be required to be more selfimplementing. To the extent the final rule contains self-implementing criteria. the system knows what it is required to do from the face of the rule, a judgment by the State (either a system-specific decision, or the State's own selfimplementing criteria) is unnecessary. Because self-implementing criteria minimize transactional costs and are easier to enforce, they are generally desirable. However, since selfimplementing criteria do not allow for site-specific considerations, they are not always appropriate. As proposed, the disinfection requirements, as they relate to CT values, are self-implementing for unfiltered systems, but not for filtered

Other reasons why EPA included CT values in the rule for unfiltered systems. versus not for filtered systems, were: (1) For free chlorine, which is the most widely used disinfectant, more data are available on which to base the CT values required for unfiltered systems than there are for filtered systems; (2) In general, unfiltered supplies are at greater risk to waterborne disease than are filtered supplies and, therefore, depending upon the technology in place, source water quality, and issues relating to disinfectant by-products, States should have less flexibility in setting disinfection requirements for unfiltered systems; and (3) The proposed rule includes self-implementing turbidity performance criteria for filtered supplies that, in part, serve as an indicator for Giardia cyst removal; without CT values in the rule for unfiltered systems, there would be no self-implementing indicator for the level of Giardia cyst inactivation in these systems. Is EPA's rationale for including CT values in the rule for unfiltered systems but not for filtered systems reasonable?

For unfiltered systems, is it reasonable to include in the rule CT values for some disinfectants (e.g., chlorine) and not for others (e.g., ozone), leaving the latter to guidance, depending

on the amount of data that is available for a given disinfectant. Should EPA include CT values in the rule for unfiltered supplies for all disinfectants and give States the option of allowing lower CT values based on site-specific studies in which the system demonstrates that disinfection achieves at least 99.9 percent and 99.99 percent inactivation of Giardia cysts and enteric viruses, respectively? Should CT values for filtered systems be included in the rule, rather than leaving them in guidance? What rationale should support EPA's decisions on these issues?

III. Economic Impact

The additional regulatory options and clarification in this notice would have varying effects on the total cost of the compliance with the rules. In most cases, costs would be lower than the proposed rules.

Following is a brief discussion of the cost implications of the changes discussed in the two proposed rules. Where dollar values are shown, the estimates should be considered highly approximate. They will be refined by the time the rule is promulgated.

1. Coliform Rule

• Number of sampling sites. States would incur additional costs to review each system's sampling plan but system would have reduced costs due to need to identify fewer locations.

These costs are expected to be negligible.

- Public notification for a single fecal coliform-positive sample. Latitude given to the States is expected to result in fewer notifications, but maintain the follow-up requirement, with lower attendant costs.
- Monitoring frequency. The reduction in monitoring frequency for systems serving fewer that 500 people is expected to reduce the "best case" cost estimate from \$72 million/year to \$55 million/year.
- Sanitary surveys. No significant change in costs.
- Number of repeat samples. Several options for a reduction in the number of repeat samples are presented. A representative estimate of the savings is less than one million dollars per year, nationwide. The savings to any particular small system could be 40 percent of previous estimates.
- Long-term MCL. No significant change in costs is expected, since the number of samples taken would remain unchanged. There may be some small savings in implementation costs to the States because they will not have to track systems for more than one year.

- Analytical methods for coliforms. Costs for coliform testing are expected to decrease significantly, perhaps as much as 33 percent, with the use of the Autoanalysis Colilert test. The test is simpler and less labor-intensive than existing methods. In addition, systems may be permitted to test for E. coli in place of fecal coliforms. Testing for E. coli by the Autoanalysis Colilert method can be done at no additional cost, since it merely involves viewing a total coliform-positive culture under an ultraviolet light.
- Clarifications and corrections to the proposed coliform rule. The compliance costs for noncommunity water systems are expected to be less because monitoring requirements are tied to population served, and the definition of population served would be changed from total monthly population to average daily population. National costs might drop by as much as 10 percent.

2. Surface Water Treatment Rule

- · Disinfection residual in the distribution system. Other than the costs for monitoring, and the costs for systems not currently disinfecting to install disinfection, the costs assumed for compliance with this criterion were assumed to be negligible under the proposed rule. Based on public comments received, it appears that EPA may have underestimated the cost associated with this criterion. If EPA adopted the option discussed in this notice the cost impacts for complying with this criterion would be reduced. EPA anticipates that the national costs associated with complying with this criteria, modified according to the option discussed in this notice, would be very small relative to the other costs for complying with this rule. EPA is currently evaluating these costs and solicits comment on data that might be considered in this analysis.
- Continuous disinfection residual at the entry to the distribution system. A change from continuous monitoring to the use of a grab sample for systems serving fewer than 500 people is expected to reduce national costs from \$8.8 million to \$4.3 million per year. System level costs of residual monitoring would drop by 85 percent.
- Turbidity monitoring and performance criteria. These changes are expected to reduce national costs from \$3.5 million to \$1.6 million per year. System level costs of turbidity monitoring would drop by 85 percent.
- CT values. The various changes under consideration would reduce the cost of compliance compared to the proposed rule for unfiltered systems.

However, a review of the public comments suggests that the costs in the proposed rule may have been underestimated for filtered systems. Although CT values are not specified in the rule for filtered systems, the Guidance Manual recommends different levels of disinfection as a function of different source water quality criteria. Under the proposed rule, EPA assumed that costs for filtered systems to modify existing disinfection practice to be negligible when compared with treatment costs to upgrade filtration practice. EPA is currently evaluating the national costs for filtered systems to upgrade disinfection to meet the guidelines that will be recommended in the final Guidance Document. This

analysis is not yet complete because, as already mentioned, the CT values are under consideration for change.

The Agency solicits comments on its use of the population-based discriminator found throughout the rule package. Generally, monitoring requirements are less onerous for systems which serve fewer than 500 people. EPA would like comments on alternative size discriminators, for all elements of the filtration and coliform rule including the use of service connections in place of population.

IV. Request for Public Comments

EPA welcomes any comments on the November 3, 1987, proposed rules, as well as comments on the specific issues and options described in this notice.

V. Citation

Hoff, J.C., Rice, E.W., and Schaefer, F.W. Comparison of Animal Infectivity and Excystation as Measures of *Giardia muris* Cyst Inactivation by Chlorine. Appl. Environ. Microbiol. 50:1115–1117. 1985.

Geldreich, E.E., Greenberg, C.H., Haas, C.H., Hoff, J.C., Karlin, R.J., Martin, J., Moser, R.H., Regunathon, P., Reich, K., and Victoreen, H. Organisms in Water Committee Report: Microbiological Considerations for Drinking Water Regulation Revisions. Jour, AWWA, pp. 81–88, May 1987.

Date: April 27, 1988.

Rebecca W. Hanmer,

Acting Assistant Administrator for Water. [FR Doc. 88–10080 Filed 5–5–88; 8:45 am] BILLING CODE 6560-50-M



Friday May 6, 1988

Part IV

Department of Transportation

Federal Aviation Administration

14 CFR Parts 21, 25, and 36 Standards Governing the Noise Certification of Aircraft; Final Rule

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 21, 25, and 36

[Docket No. 23340 Amendment Nos. 21-62, 25-63, and 36-15]

Standards Governing the Noise Certification of Aircraft

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This final rule revises certain provisions of the regulations prescribing requirements for aircraft noise certification to make them more understandable and easier to use. This amendment also contains substantive regulatory changes simplifying noise certification test and recordkeeping requirements. This regulation is part of the President's regulatory reform program and is based on the body of good engineering practice that has developed since the original adoption of Part 36 in 1969. It also reflects comments received from the general public and the aviation industry in response to a Petition for Rulemaking from the Aerospace Industries Association of America and to an FAA Notice of Proposed Rulemaking.

EFFECTIVE DATE: Effective date of this amendment is May 6, 1988.

FOR FURTHER INFORMATION CONTACT:
Mr. Harvey VanWyen, Noise Policy and
Regulatory Branch (AEE-110), Noise
Abatement Division, Office of
Environment and Energy, Federal
Aviation Administration, 800
Independence Avenue SW.,
Washington, DC 20591, Telephone (202)
267-3558.

SUPPLEMENTARY INFORMATION: The purpose of this revision is to amend portions of the Federal Aviation Regulations (14 CFR Part 36) and amend references in Part 36 contained in other parts (14 CFR Parts 21 and 25). This amendment is based on Notice No. 85–2 (50 FR 4172, January 29, 1985). Comments were invited. All comments have been received and considered in the issuance of this final rule.

Synopsis of the Proposal

Part 36 of the Federal Aviation
Regulation (14 CFR Part 36) contains
noise standards for aircraft type and
airworthiness certification. As the part
is currently organized, Subparts B and C
and Appendices A, B, and C apply in
part to transport category large
airplanes and subsonic turbojet
powered airplanes regardless of
category. This amendment revises these

sections of the part to better reflect the actual technical basis for noise certification of aircraft. Substantive changes are made in the noise certification testing, recordkeeping and reporting requirements. The Federal Aviation Administration (FAA) has found that while there will be a substantial cost reduction realized as a result of these changes, there will be no net increase or decrease in noise standard compliance stringency for any class of aircraft. Further, this amendment will not result in any increase or decrease in aircraft noise levels.

Changes in Test Requirements

This amendment to the noise certification test requirements is intended to simplify the noise test procedures, to clarify the purpose of the tests, to update equipment specifications to better accommodate the use of modern digital electronics, and to further reduce the number of flight tests conducted solely for approval of relatively minor aircraft modifications. One such change involves decreasing from four to two the minimum number of sideline noise measuring stations which are used to define the maximum sideline noise. By placing the remaining microphones on either side of the point where the jet aircraft reaches 1000 feet or 1440 feet altitude (AGL), the maximum aircraft noise can be accurately determined at significantly lower costs for equipment, installation, calibration and data

Similarly, relative humidity and wind limits on test conditions are eased to maximize available test sites and usable days at those sites. The humidity limit is increased for those applicants using higher-precision instruments, while the wind limit increase is based on wide industry/government experience. The requirement which specifies the location of the meteorological instrumentation is clarified to require that the weather be measured in the vicinity of the noise measuring stations, rather than at the nearest airport.

A number of technical amendments to the analyzer specifications and to the data reporting requirements are adopted to facilitate the use of a wider variety of instrumentation, particularly the newer digital analyzers. Further, because recent computer processing advances make it possible to use data closer to the ambient noise floor and, in some cases, to reconstruct data where parts of the spectrum are below the ambient, greater flexibility is provided to the FAA in approving test and analysis procedures.

One of the major purposes of this amendment is to provide clearer

guidelines on the use of nonflight, supplemental tests to meet Part 36 certification requirements. The cost of noise certification of a single jet aircraft type often runs from several hundred thousand dollars to well over a million. Where a long production run of a complex and sophisticated aircraft is anticipated, this cost is generally insignificant when compared to the total development cost of the project. However, to meet the increasingly competitive nature of aviation in this decade, aircraft manufacturers have shortened production runs of standard models and now produce families of related short production run versions. This revision will make it easier to collect a flight data base of sufficient quality and breadth from the first aircraft in such a family so that other related aircraft can be noise certificated using that data base, supplemented by only relatively simple and inexpensive tests and analyses. For instance, noise data from static tests conducted at either the engine or aircraft manufacturer's ground facilities may be approved, as appropriate, by FAA certificating authorities.

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Changes in Documentation Requirements

The documentation requirements placed on industry and on individual applicants ae reduced as a result of this amendment. These changes will result in lower expenditures in manpower and effort by the government in the review and approval of noise certification documents.

The elimination of certain requirements for prior FAA approval of test procedures greatly simplify the paperwork prior to the test, as well as simplify the test itself. As amended, Part 36 retains the requirement for an approved test plan, albeit a simpler one. Similarly, the certification report requirement which contains the engineering data supporting the certification also remains.

Reduction of the post-certification paperwork, however, is where this amendment works its greatest effect. Previously, Part 36 required that each Airplane Flight Manual (AFM) must contain all procedures that are employed in the flight test, the certificated noise levels, any weight limitations that were required to meet the noise level requirements, and "other information for the flight crew." While this did not appear to be an onerous burden at the time the original Part 36 was adopted, the FAA has found a number of situations where these seemingly simple requirements have

resulted in a distortion of the AFM functions. Several large commercial jet aircraft types have been certificated with hundreds of different versions within each type. As a result, the AFMs contain hundreds of pages of noise "information." Under these circumstances, it becomes extremely difficult to identify which data are applicable to any particular airplane on a given day.

The AFM is a required document providing on-board information necessary for the flight crew. It contains specific aircraft performance data, flight procedures, and aircraft limitations vital to the safe operation of the airplane. As indicated above, noise information is also included. However, after careful consideration, the FAA found that it was appropriate to greatly reduce and simplify the noise portion of the manual. Aircraft weight limits or operating configurations required to meet Part 36 certification will continue to be placed in the limitations section of the AFM. However, beyond this, the FAA feels that only the minimum information necessary to obtain a Part 36 compliance statement and the takeoff, approach, and sideline noise levels for that specific airplane configuration is needed. Thus, the FAA clarifies Parts 25 and 36 to preclude the inclusion of

Other Changes

The acoustical change provisions of Part 21 are clarified by specifically excepting from the noise certification requirements several temporary configurations and conditions used for maintenance. Since none of these conditions represents the permanent configuration of any aircraft type, the FAA finds that this action is consistent with Section 611 of the Federal Aviation Act (as amended).

inappropriate information in the AFM.

Numerous references to obsolete dates and conditions are removed to shorten and simplify Part 36 while several sections have been retitled more appropriately.

Regulatory History

Since its adoption in November 1969, FAR Part 36 has been a significant basis for all Federal aircraft noise regulations in the United States. That regulation was structured to provide a firm, consistent foundation for subsequent rulemaking activities to abate and control aircraft noise. Part 36 includes precise instructions concerning the acquisition, processing, and documentation of noise data from inflight aircraft. As originally promulgated, part 36 applied only to turbojet aircraft and propeller-driven

transport category airplanes over 12,500 pounds maximum gross weight.

Amendment 36-4 (40 FR 1029, January 6, 1975) added noise certification standards for propeller-driven small airplanes. The noise level limits for certain new turbojets and transport category airplanes were lowered in 1977 by Amendment 36-7 (42 FR 12360, March 3, 1977). In 1978, these lower noise level standards were applied to derivatives of older aircraft types. Noise standards for Concorde supersonic transport airplanes were also adopted in 1978 by Amendment 36-10 (43 FR 28406, June 29, 1978).

Amendment 36-9 (43 FR 873, March 2, 1978), which was adopted in 1978, widely revised the test and analysis specifications contained in Appendices A and B of Part 36. The specifications were expanded to include technical details that had been omitted from the original publication. An example of this was the addition of a section on the calibration of acoustical test equipment. Other changes were made to bring FAR Part 36 into substantial agreement with international standards on noise measurement and with the procedures adopted for noise certification by the International Civil Aviation Organization (ICAO).

The FAA published (47 FR 47854, October 28, 1982) for public comment, a petition from the Aerospace Industries Association of America (AIA) on behalf of its member aircraft manufacturers for amendment of FAR Parts 21 and 36. Notice No. 85–2 (50 FR 4172, January 29, 1985) contained a summary of the comments submitted to the Docket in response to the petition, and the disposition of the issues raised. Notice No. 85–2 also proposed 41 specific changes to Part 36. A discussion of docketed comments on those proposals and the disposition of the issues follow.

Discussion of Comments

Interested persons have been afforded the opportunity to participate in development of all aspects of this rulemaking by submitting written comments to the public regulatory docket. The period for submitting comments closed April 4, 1985. All comments received have been reviewed and considered in the issuance of this final rule.

Thirteen public comments were received in response to the notice (Docket No. 23340). All of the commenters supported the stated goals and most of the 41 proposed amendments. In addition, nearly every response contained specific suggestions or recommendations about one or more issues.

The comments are discussed below. They are grouped by broad categories of issues.

Acoustical Change

Meeting the noise requirements of Part 36 is one of the steps in the certification approval process for any change to an already certificated aircraft. Included are changes to the aircraft type design which might affect the noise emission characteristics of the aircraft. The definition of acoustical change and the requirement to meet Part 36 standards for design changes within that definition are in Part 21. In Notice 85-2, the FAA proposed to exempt from the definition of acoustical change for turboject aircraft and transport category large aircraft configured for (a) gear down flight with one or more retractable landing gear down during the entire flight and (b) carriage of a spare engine and nacelle carriage external to the skin of the airplane (and just the pylon or other external mount).

Only two comments were received on this issue. Both supported the proposed change as reasonable and necessary. The FAA agrees and is adopting the modification as proposed.

Aircraft Flight Manual

Over the past several years, there has been some concern that the aircraft operational limits, if any, that are established as a result of FAR 36 noise certification are not being expressed properly in the Aircraft Flight Manual (AFM) when promulgated with reference to the airworthiness limitations. To clarify the intent of the existing regulations, Notice No. 85–2 proposed to add clarifying language in Part 25 (where additional AFM requirements are listed) and in Part 36.

Section 25.25(a) clarifies that the maximum gross weight which meets the noise requirements of Part 36 limits the maximum certification weight. One of the two commenters supported the clarification; the other, a large trade association, reported that some members were opposed while others were favorable. The FAA notes that this provision does not change the regulatory requirement, but simply clarifies the Part 25 certification process by expressly referencing the weight certification requirements of Part 36. The FAA, therefore, is adopting this clarification.

Similarly, Notice No. 85–2 proposed to clarify the definition of Stage 1, Stage 2, and Stage 3 airplanes by categorically stating that each airplane can only be classified in one stage given a specific configuration.

Five commenters responded on this issue. All were opposed to the specific wording proposed for § 36.1(g) because, in their opinion, the words could be interpreted as requiring each airplane to remain within one Part 36 Stage.

However, none of the commenters appeared to object to the stated intent of the proposal and several suggested small changes in the regulatory language to eliminate the problem.

For more than a decade, the FAA has both encouraged and required the application of available noise reduction technology. The goal has been to move Stage 1 aircraft into Stage 2 and Stage 2 aircraft into Stage 3. In most cases, this has been done voluntarily without the need for regulation. The FAA does not intend to inhibit such actions. Therefore, in light of the comments the FAA had decided to accept the suggestion of one commenter that the regulation should more clearly indicate that an airplane may not be certified to two stages simultaneously or that an airplane may not, without a change in type design configuration, comply with one stage and then another. Further, it should be noted that current regulations clearly prohibit Stage 2 or Stage 3 aircraft from becoming Stage 1 aircraft.

Notice No. 85-2 also proposed three minor changes in § 36.1581 to clarify that the AFM allows only one certification noise value each for takeoff, approach, and sideline. Since, for flight safety reasons, the AFM on board any airplane may only describe the one current certificated configuration for the airplane, the present rules only require the AFM to have the noise information for that one configuration. As noted in Notice 85-2, the lack of clarity in the Federal Aviation Regulations has caused some manuals to contain detailed noise information on dozens and possibly hundreds of different configurations. The AFM, however, is basically a flight safety document containing vital information for the pilot and crew. While it was determined more than 15 years ago that it would serve a legitimate and useful purpose for the AFM to contain limited noise information, it never was intended for the AFM to become a noise primer on every possible variation in noise levels that might result from changes in configuration, operating procedure, or weather conditions. Thus, Notice 85-2 proposed to consolidate the existing regulations that affect the selection of noise data for the AFM and eliminate the requirement for noise certification

Seven comments were received on the proposed amendments to § 36.1581. All

test procedures to be included.

agreed with the need to reduce the volume of noise information in the AFMs and with the proposal to eliminate the requirement for noise certification test procedure documentation. Several commenters expressed concern that the FAA's proposed language would limit the use of several "configurations" that have been approved for both safety and noise. The FAA cannot agree.

An airplane is a versatile machine. In most cases, it is designed and built so that it may be operated with different combinations of weight, speed, flap settings, engine power setting, etc. Combinations of these parameters are optimized by the manufacturer for different missions (range payload, speed, weather, runway length, etc.). Each combination is called a configuration. Each configuration, in turn, has clearly stated operating limits involving various parameters. These limits are set by the airplane's manufacturer on the basis of safety. Occasionally, these limits may be further restricted by the manufacturer to lower the noise level of the airplane. The FAA oversees this process on each configuration of every airplane type, maintaining first the highest degree of safety. The FAA's approval is called certification. As a part of this certification, the FAA approves the manufacturer's AFM which contains detailed information needed by the pilot and crew to safely operate the airplane within the limitations of one configuration.

An airline or other operator may purchase from the manufacturer the right to use several different configurations of the same airplane. However, for safety reasons it is vital that the pilot and crew know the limitations applicable to the specific configuration that they are flying that day. Thus, FAA safety rules require each AFM to describe only one configuration at any point in time, no matter how many other configurations the manufacturer has sold to the operator. The proposed changes to § 36.1581 would not change this; they would only restate the existing airworthiness requirement in that portion of Part 36 which deals with AFM information. The FAA believes that this is necessary to avoid confusion. For that reason, the proposed amendments to § 36.1581 are adopted.

Obsolete Dates and Conditions

Numerous references to dates and conditions that are no longer pertinent to present and future applicants for type certification were proposed for removal under Notice No. 85–2. All commenters to the Docket endorsed this activity.

Three, however, had comments on specific proposed deletions. A U.S. trade association suggested that "(except as provided in § 36.7)" be inserted in § 36.201(b) after the words "type certifications." The FAA does not agree and the language as proposed in the Notice is adopted.

A British trade association and a British manufacturer submitted identical comments suggesting deletion of the provisions, contained in § 36.7(d), which use the engine bypass ratio in determining which provisions apply to applications for "acoustical changes" The FAA agrees that § 36.7(d) should be simplified and shortened. However, the FAA also believes that implementation of this specific suggestion would be neither economically reasonable nor technologically practicable. The differing technologies available to high and low bypass ratio engines require different treatment under the retulation. Thus, the FAA believes that implmeentation of this suggestion would have the effect of restricting the applicability of Part 36 to new type designs and to the first few derivative configurations. Since adoption of this restriction would prevent the FAA from complying with the intent of Part 36, the FAA declines to accept the suggestion.

Certification Reports

Sections 36.1501 and A36.5 contain the documentation requirements for technical data reports on certification tests and results. Notice 85–2 proposed to clarify the required information and further proposed to specifically allow inclusion of data from supplemental test (such as ground-based static tests of engines). This increased flexibility would allow wider use of cost-saving equivalent procedures as long as the data could be analyzed to yield results that would be equivalent to the results of actual aircraeft flight tests.

Only one comment was received on the proposed change to § 36.1501. The commenter opposed the use of 'equivalent procedures" such as groundbased static engine tests since such tests by themselves would not be a true measure of the noise increments experienced from an engine change. The commenter states that such changes are often accompanied by changes in nacelles, wing design, fuselage length, and gross weight. The FAA, on the basis of experience, agrees with the reasoning but does not agree with the conclusion. No equivalent procedure has ever been approved (nor would it be under the revised text) under the conditions described where the only supplemental

data are those derived from static engine testing. All acoustical and performance data used to develop noise certification levels are based on actual flight tests. The supplemental tests which would be documented under § 36.1501 and section A36.5 are only used to make adjustments to the flight data where it can be shown that there are no other changes to the noise sources, including their relative contributions to the total noise signature. Supplemental flight data or a totally new flight data base might be necessary to derive the noise level numbers under the cited conditions. For these reasons, and because the proposed change would not affect the approval of equivalent procedures but only the test documentation, the FAA disagrees and adopts the language proposed on the Notice.

Two comments were received on the proposed change to section A36.5. Both suggested the inclusion of "appropriate propeller powered aircraft performance parameters relevant to noise generation." While the FAA believes this suggestion may be valuable, its inclusion would be outside the scope of Notice 85–2. The FAA will consider including this concept in future

rulemaking.

One commenter also noted that the wording of the proposed revision to section A36.5(b)(5)(vii) would remove the requirement for aircraft height and position data independent of normal flight instrumentation. Since this is a key part of ICAO certification, adoption of the proposed wording could have the effect of invalidating international acceptance of U.S. certifications, along with the attendant economic consequences. The FAA did not intend to remove the requirement for independent height and position data, but agrees that the proposed wording would have that effect. Consequently, the FAA has decided not to adopt the proposed revision of that section.

Test Procedures

Notice 85–2 proposed nine separate changes in the Part 36 noise certification test procedures. In each case, the intent of the proposed change was to lower the cost of certification without significantly diluting the quality of the noise data used for certification.

Seven comments were received on the proposed changes to section A36.1(b). All supported the proposed simplifications, although one commenter expressed concern with regard to the FAA's credibility in administering the noise certification process. It should be noted that the FAA continues its commitment to a strong noise regulatory

structure. To this end, the FAA has reviewed these procedures with national and international experts and remains confident that the noise certification process will remain intact and effective. Simplification and cost savings are not being purchased by a decrease in stringency or thoroughness.

In response to a British suggestion, the word "height" is substituted for "altitude" in section A36.1(b)(7) to signify the airplane's height above the local terrain containing the noise measuring sites. Similarly, a test tolerance (500 to 0 ft.) on this height is inserted, because without such a tolerance the airplane would be required to make every test flight 1000 to 1440 ft.

above the terrain.

Notice 85-2 proposed to require more accurate measurements of ambient temperature and relative humidity. It also establishes a higher upper limit average wind speed for the microphone and a higher limit crosswind speed average for the aircraft. It also proposed to increase the upper limit average wind speed from 10 knots to 12 knots for the instrumentation and the acceptable crosswind speed for the microphone from 5 knots to 7 knots. The maximum wind speed cannot exceed 15 knots for the instrumentation and 10 knots for the crosswind. The Notice also proposed to clarify that the meteorological variables should be measured in the vicinity of the noise monitors. Widening these weather windows would lower costs to both industry and government by minimizing the delays which presently tie up equipment, aircraft, and personnel for days while waiting for specific weather conditions. Five comments were received. One supported the proposal, one wanted to remove all test weather limits under certain conditions, and three foreign organizations objected because of the belief that the Notice proposed maximum winds of 15 knots and crosswind limits of 10 knots. They suggested use of the ICAO limits, 12 and 7 knots, respectively. However, the FAA notes that Notice 85-2 did, indeed, propose the ICAO values of 12 and 7 knots for the upper average limits while also setting maximum values. Therefore, the FAA adopts the proposed revisions.

A number of changes were proposed in the technical specifications for the electronic equipment used in the collection and analysis of the noise data. These changes generally follow the standards adopted by the ICAO and should minimize costs where manfacturers have to certificate to both

ICAO and U.S. standards.

Eight comments were received on the proposed revisions to the microphone specifications. Most were general comments on the need to duplicate the ICAO specifications. One specific comment noted that the wording of the last sentence of section A36.3(c)(2)(ii) varied somewhat from the ICAO standard and that this difference would cause applicants difficulty. After considering the issue, the FAA agrees and the amended specification is adopted with the suggested change.

The FAA also proposed to revise the electronic specifications for the noise analyzer. Earlier specifications were based on the analog system used a decade ago. Notice 85-2 proposed, instead, to update this section, based on the digital equipment currently in use. Since ICAO has not yet adopted similar revisions, most of the seven commenters recommended delaying adoption. However, the FAA believes that the problems encountered by both applicants and government in trying to qualify digital systems under analog specifications require the FAA to act. Thus, the proposed revision to section A36.3(d) is adopted. However, should ICAO eventually adopt differing specifications, it is the intention of the FAA to issue a subsequent notice proposing adoption of the ICAO standard in the United States. In adopting section A36.3(d)(5)(i), the FAA also corrects a typographical error that appeared in the Notice. The correct standard deviation is 0.48 decibels.

Data Correction and Analysis

Notice 85-2 proposed to amend section A36.5 to clarify the information that is needed to correct the data to standard reference conditions in that the referenced atmosphere should be considered to be homogeneous. Specifically, only those engine performance parameters relevant to noise generation, such as net thrust, engine pressure ratio, exhaust temperatures, and fan or compressor rotational speeds, would be reported. Aircraft sound pressure levels need to exceed the ambient background by only 3 decibels instead of the present 5 decibels. The Notice proposed to allow lower signal-to-noise ratios if the method for separating the signal from the noise is approved by the FAA. Several other amendments to Appendices A and B of FAR 36 were proposed that would make relatively minor changes to mathematical constants in the correction procedures or that would make minor revisions in the description of the procedures. These were considered to be clarifying, not substantive, even when the amount of data to be reported was reduced.

Seven of the comments responded to these proposed changes with suggestions for improving the clarity of the revisions. These minor typographical suggestions have been incorporated.

Other Comments

Several respondents to the Docket took the opportunity to make suggestions for additional changes and modifications outside the scope of Notice 85–2. Even though some of these comments appear to have merit, the FAA does not believe their cumulative value justifies a delay in issuing this final rule in order to issue a supplemental NPRM.

Section-by-Section Analysis

Part 21

Section 21.93 prescribes the procedural requirements for the approval of changes in type design that may increase the noise levels of an airplane type. Paragraph (b)(2) is amended to add an exclusion for gear down flight with one or more retractable landing gear down during the entire flight and for spare engine and nacelle carriage external to the airplane skin (and the return of the pylon or other external mount).

Part 25

Section 25.25 contains the criteria upon which the maximum weight of an aircraft is based. This section is clarified to note that the highest weight at which compliance is shown with the certification requirements of Part 36 may be, under some circumstances, the limiting maximum weight.

Part 36

The last sentence of § 36.7(e)(1) is amended to clarify that Part 36 noise tradeoff provisions may not be used to increase non-complying Stage 1 noise levels. The Part 36 tradeoff provisions can be used, however, once the modified airplane qualifies as a complying Stage 2 airplane. This could occur, for instance, when the aircraft increase in weight raised the allowable Stage 2 limit by more than the measured increase in noise.

Sections 36.7 (d) and (e) and 36.301(b) are revised to remove obsolete language, dates, and references. Sections 36.201 (c) and (d) are deleted for similar reasons.

Section 36.1501 is expanded to clarify the need for approval of equivalent procedures and to allow wider flexibility in the use of non-flight test data to supplement approved flight data bases.

Two subparagraphs are added to § 36.1581(a) to clarify that only one value for each noise certification test point for takeoff, sideline, and approach as defined by Appendix C may be placed in the Aircraft Flight Manual, along with associated weight and configuration. Similarly, one value for flyover as defined by Appendix F for propeller driven small airplanes may be placed in the Aircraft Flight Manual. If additional operational noise information is included in the Aircraft Flight Manual, it must be segregated from the certification data in accordance with § 36.1581(b). The old § 36.1581(c) is reworded to clarify its intent and redesignated as (d).

Appendix A of Part 36

Section A36.1(b) is revised to allow flight path intercept tests, rather than requiring only full stop takeoffs and landings for every test. This section is also amended to allow a minimum of two symmetrically-placed microphones to measure the sideline noise rather than the minimum of four currently required. Both changes are expected to provide wider flexibility in the choice of test sites and to significantly lower the cost of such tests.

Section A36.1 is revised to expand the flight test weather window when the dew point and dry bulb temperature are measured with an instrument accurate to within one-half degree Centigrade. The allowable winds during the test are increased to those specified in ICAO Annex 16. The requirements to generate noise level versus weight information for takeoff and approach are deleted.

A number of the technical specifications in section A36.3 are revised to accommodate the use of digital recording and filtering techniques. Sections A36.3(e)(7) is revised to require a performance calibration analysis of each piece of calibration equipment at least once every six months.

Section A36.5 contains the requirements on reporting and correcting measured data. Section A36.5(b) is revised to eliminate the need to obtain engine performance data solely from flight instrumentation or manufacturer's data. By this revision, static tests and other sources of supplemental data can be employed. Section A36.5(c) is also amended to indicate that the noise certification atmosphere is homogeneous. That section is also amended to replace an erroneous reference to "design" landing weight with the correct reference to "maximum" landing weight.

Section A36.5(d) is amended to accept one-third octave band data that are at least 3 decibels above the mean background noise in that band. Before this amendment, the data had to be at least 5 decibels above ambient. This change permits greater flexibility in the choice of test conditions and is particularly necessary for the test of quiet airplanes. Greater flexibility is also provided by the approved use of time/frequency interpolation and equivalent procedures within the indicated limits.

Section A36.5(e) is revised to add a new paragraph (4) which specifically allows the orderly development of noise certification for certain derivatives of aircraft type design, and provides simplified methods for computing the 90 percent confidence limit for those derivatives.

The requirements in section A36.9(b) for locating meteorological measurements have been changed to permit their placement near the measuring stations, rather than using meteorological data from the nearest airport. This is intended to improve the quality of the meteorological data in those cases where the flight tests are not conducted at an airport. Another change to the meteorological specifications is made in section A36.9(d)(2) where the criterion for using the simplified method for deriving the values of the atmospheric coefficients has been broadened. Accordingly, the simplified method may be used if the atmospheric absorption coefficients do not vary over the sound propagation path of the maximum noise by more than plus or minus 1.6 decibels per thousand feet in the 3150 Hertz one-third octave band.

Section A36.11(a)(3)(v) is amended to delete the requirement for graphical or tabular data presentations during data correction. These corrections may not be done by computer or other appropriate means.

Several small corrections are made to section A36.11(e). One updates a cross-reference to sections A36.11 (b) and (c), while the others correct a mathematical constant used in the Delta 2 calculations for takeoff, approach and sidelines.

Section A36.11(f) is completely revised and considerably shortened to provide clearer guidance or appropriate correction procedures when the takeoff and/or approach noise measurements are made at non-standard locations.

Two alternative methods are provided.

Appendix B of Part 36

Section B36.5(h) and Table B-2 are revised to eliminate calculation of tone penalties for tones less than 1.5 decibels.

Sections B36.9, B36.11, and B36.13 contain the technical and mathematical details of the methods for calculating Effective Perceived Noise Levels (EPNL). Several small changes are made in the

formulation to simplify the computerized procedure.

Appendix C of Part 36

Sections C36.5(c), C36.7(d), and C36.9(d) are deleted as unnecessary and the subsequent sections are redesignated accordingly. Sections C36.7 and C36.9 are retitled to better describe their functions.

Regulatory Impact Evaluation

The FAA conducted a detailed regulatory evaluation which is included in the regulatory docket. This evaluation assesses the economic impact of all changes to Parts 21, 25, and 36. The FAA has determined that this rule is consistent with the objectives of Executive Order 12291 as part of the President's Regulatory Reform Program to reduce regulatory burdens on the public. This rule imposes no additional costs on the Federal government.

The amendments in this rule will provide benefits in the aggregate to the aviation industry and the general public. These benefits arise from deletion of unnecessary noise certification testing and recordkeeping requirements. clarification of regulatory text, and relaxation of certain test and documentation requirements. The amendments better reflect new technologies and consequently many amendments are clarifying and editorial in nature. As an overall result of these amendments, the regulations are more concise and easier to understand. None of the amendments are expected to result in a major cost to the aviation industry. There are 10 amendments which are expected to yield minimal to minor benefits and three amendments are expected to result in minimal to minor costs. One of the amendments which will reduce from 4 to 2 the number of sideline measurement stations needed as part of the aircraft noise certification process is estimated to save manufacturers approximately \$2.0 million discounted over a 10 year period. For the reasons stated above, the benefits flowing from these amendments substantially outweigh any associated

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily and disproportionately burdened by government regulations. The RFA requires government agencies to review rules which may have a "significant economic impact on a substantial number of small entities."

These amendments directly impact large manufacturers of aircraft. The

FAA size threshold for a determination of a small entity for aircraft manufacturers is 75 employees; that is, any aircraft manufacturer with more than 75 employees is considered not to be a small entity. Based upon this size threshold, the aircraft manufacturers affected by this rule are not small entities. Moreover, of the potential cost impacts, three require minimal computer programing changes which can be accomplished in-house. One of the amendments is estimated to save the manufacturers approximately \$2.0 million. The remaining changes are editorial in nature. This rule will not have any significant economic impact.

Therefore, the FAA certifies, this rule will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

Environmental Analysis

Pursuant to Department of
Transportation "Policies and Procedures
for Considering Environmental Impacts"
(FAA Order 1050.1D), a Finding of No
Significant Impact has been made.
These amendments are primarily
administrative, clarifying and
organizational, and do not significantly
affect the quality of the human
environment.

Conclusion

For the reasons stated above, the FAA has determined that this document involves a regulation which is not major as defined in Executive Order 12291 and not significant under Department of Transportation Regulatory Policies and Procedures (44 FR 11034, February 26, 1979). In addition, the FAA certifies that under the criteria of the Regulatory Flexibility Act this final rule will not have a significant economic impact on a substantial number of small entities. A copy of the regulatory evaluation may be examined in the regulatory docket or obtained by contacting the person. identified under the caption "FOR FURTHER INFORMATION CONTACT."

List of Subjects

14 CFR Part 21

Aircraft certification procedures for products and parts, Aircraft.

14 CFR Part 25

Airworthiness standards, Aircraft,

14 CFR Part 36

Noise standards, Aircraft noise and type certification.

The Final Rule

Accordingly, the Federal Aviation Regulations (14 CFR Parts 21, 25, and 36) are amended, effective May 6, 1988, as follows:

PART 21—CERTIFICATION PROCEDURES FOR PRODUCTS AND PARTS

1. The authority citation for Part 21 continues to read as follows:

Authority: 49 U.S.C. 1344, 1348(c), 1352, 1354(a), 1355, 1421 through 1431, 1502, 1651(b)(2), 42 U.S.C. 1657f-10, 4321 et seq.: E.O. 11514; 49 U.S.C. 106(g) (Revised Pub. L. 97-449, January 12, 1983).

2. Section 21.93(b)(2) is revised to read as follows:

§ 21.93 Classification of changes in type design.

(b) * * *

(2) Turbojet powered airplanes (regardless of category). For airplanes to which this paragraph applies, "acoustical changes" do not include changes in type design that are limited to one of the following—

(i) Gear down flight with one or more retractable landing gear down during

the entire flight, or

(ii) Spare engine and nacelle carriage external to the skin of the airplane (and return of the pylon or other external mount), or

(iii) Time-limited engine and/or nacelle changes, where the change in type design specifies that the airplane may not be operated for a period of more than 90 days unless compliance with the applicable acoustical change provisions of Part 36 of this chapter is shown for that change in type design.

PART 25—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES

3. The authority citation for Part 25 is revised to read as follows and the authority citations following the sections in Part 25 are removed:

Authority: 49 U.S.C. 1344, 1354(a), 1355, 1421, 1423, 1424, 1425, 1428, 1429, 1430; 49 U.S.C. 106(g) (Revised Pub. L. 97-449, January 12, 1983).

4. Section 25.25 is amended by adding "; or" at the end of paragraph (a)(2) and by adding a new paragraph (a)(3) to read as follows:

§ 25.25 Weight limits.

(a) * * *

(3) The highest weight at which compliance is shown with the certification requirements of Part 36 of this chapter.

PART 36-NOISE STANDARDS: AIRCRAFT TYPE AND **AIRWORTHINESS CERTIFICATION**

5. The authority citation for Part 36 continues to read as follows:

Authority: 49 U.S.C. 1344, 1348, 1354(a), 1355, 1421, 1423, 1424, 1425, 1428, 1429, 1430, 1431(b), 1651(b)(2), 2121 through 2125; 42 U.S.C. 4321 et seq.; Sec. 124 of Pub. L. 98-473, E.O. 1114, 49 U.S.C. 106(g) (Revised Pub. L. 97-449, January 12, 1983).

6. Section 36.1 is amended by redesignating (g) as (h) and adding a new (g) to read as follows:

§ 36.1 Applicability and definitions.

(g) For purposes of showing compliance with this part for transport category large airplanes and turbojet airplanes regardless of category, each airplane may not be identified as complying with more than one stage or configuration simultaneously.

7. Section 36.7 is amended by revising the last sentence of paragraph (c)(1), and revising paragraphs (d) and (e) to

read as follows:

§ 36.7 Acoustical change: Transport category large airplanes and turbojet powered airplanes.

(c) * * *

- (1) * * * There tradeoff provisions of section C36.5(b) of Appendix C of this part may not be used to increase the Stage 1 noise levels, unless the aircraft qualifies as a Stage 2 airplane.
- (d) Stage 2 airplanes. If an airplane is a Stage 2 airplane prior to the change in type design, the following apply, in addition to the provisions of paragraph (b) of this section:

(1) Airplanes with high bypass ratio turbojet engines. For an airplane that has turbojet engines with a bypass ratio of 2 or more before a change in type

design-

(i) The airplane, after the change in type design, may not exceed either (A) each Stage 3 noise limit by more than 3 EPNdB, or (B) each Stage 2 noise limit, whichever is lower:

(ii) The tradeoff provisions of section C36.5(b) of Appendix C of this part may be used in determining compliance under this paragraph with respect to the Stage 2 noise limit or to the Stage 3 plus 3 EPNdB noise limits, as applicable; and

(iii) During the takeoff and sideline noise test conducted before the change in type design, the quietest airworthiness approved configuration available for the highest approved takeoff weight must be used.

(2) Airplanes that do not have high bypass ratio turbojet engines. For an airplane that does not have turbojet engines with a bypass ratio of 2 or more before a change in type design-

(i) The airplane may not be a Stage 1 airplane after the change in type design;

(ii) During the takeoff and sideline noise tests conducted before the change in type design, the quietest airworthiness approved configuration available for the highest approved takeoff weight must be used.

(e) Stage 3 airplanes. If an airplane is a Stage 3 airplane prior to the change in type design, the following apply, in addition to the provisions of paragraph

(b) of this section:

(1) If compliance with Stage 3 noise levels is not required before the change in type design, the airplane must-

(i) Be a Stage 2 airplane after the change in type design and compliance must be shown under the provisions of paragraph (d)(1) or (d)(2) of this section, as appropriate; or

(ii) Remain a Stage 3 airplane after the change in type design. Compliance must be shown under the provisions of paragraph (e)(2) of this section.

(2) If compliance with Stage 3 noise levels is required before the change in type design, the airplane must be a Stage 3 airplane after the change in type design.

8. Section 36.201(b) is revised and (c)

and (d) are removed.

§ 36.201 Noise limits.

(b) Type certification applications for subsonic transport category large airplanes and all subsonic turbojet powered airplanes must show that the noise levels of the airplane are no greater than the Stage 3 noise limits prescribed in section C36.5(a)(3) of Appendix C of this part.

9. Section 36.1501 is revised to read as

follows:

§ 36.1501 Procedures, noise levels and other information.

(a) All procedures, weights, configurations, and other information or data employed for obtaining the certified noise levels prescribed by this part, including equivalent procedures used for flight, testing, and analysis, must be developed and approved. Noise levels achieved during type certification must be included in the approved airplane (rotorcraft) flight manual.

(b) Where supplemental test data are approved for modification or extension of an existing flight data base, such as acoustic data from engine static tests used in the certification of acoustical

changes, the test procedures, physical configuration, and other information and procedures that are employed for obtaining the supplemental data must be developed and approved.

10. Section 36.1581 is amended by revising paragraph (a); removing paragraph (c); redesignating paragraphs (b), (d), (e), and (f), as (c), (e), (f), and (g) respectively; adding new paragaphs (b) and (d); and revising newly redesignated paragraph (g) to read as follows:

§ 36.1581 Manuals, markings, and placards.

- (a) If an Airplane Flight Manual or Rotorcraft Flight Manual is approved, the approved portion of the Airplane Flight Manual or Rotorcraft Flight Manual must contain the following information, in addition to that specified under § 36.1583 of this part. If an Airplane Flight Manual or Rotorcraft Flight Manual is not approved, the procedures and information must be furnished in any combination of approved manual material, marketing, and placards.
- (1) For transport category large airplanes and turbojet powered airplanes, the noise level information must be one value for each takeoff, sideline, and approach as defined and required by Appendix C of this part, along with the maximum takeoff weight, maximum landing weight, and configuration.
- (2) For propeller driven small airplanes the noise level information must be one value for flyover as defined and required by Appendix F of this part, along with the maximum takeoff weight and configuration.
- (b) If supplemental operational noise level information is included in the approved portion of the Airplane Flight Manual, it must be segregated, identified as information in addition to the certificated noise levels, the clearly distinguished from the information required under § 36.1581(a).
- (d) For transport category large airplanes and turbojet powered airplanes, for which the weight used in meeting the takeoff or landing noise requirements of this part is less than the maximum weight established under the applicable airworthiness requirements, those lesser weights must be furnished, as operating limitations in the operating limitations section of the Airplane Flight Manual. Further, the maximum takeoff weight must not exceed the takeoff weight that is most critical from a takeoff noise standpoint.

(g) Except as provided in paragraphs (d), (e), and (f) of this section, no operating limitations are furnished under this part.

Appendix A-Aircraft Noise Measurement Under § 36.101

11. Section A36.1 is amended by revising paragraphs (b)(1), (b)(7), (c)(3), (c)(4); and removing (d) (5)(iii) and (7)(iii) to read as follows:

Section A36.1 Noise certification test and measurement conditions.

(b) · · ·

- (1) Tests to show compliance with established aircraft noise certification levels must consist of a series of takeoffs and approaches (or stabilized flight path segments thereof) during which measurements must be taken at noise measuring stations located at the measuring points prescribed in section C36.3 of Appendix C of this part. Each recorded segment must include measurements throughout the entire time period in which the recorded signal is within 10 dB of PNLTM. thought little
- (7) A minimum of two noise measuring stations, symmetrically positioned about the test flight track, must be used to define the maximum sideline noise with respect to location and level as required by section C36.3 of Appendix C of this part. For turbojet powered aircraft, when approved by the FAA, the maximum sideline noise at takeoff thrust may be assumed to occur at the point (or its approved equivalent) along the extended centerline of the runway where the aircraft reaches 1000 feet (305 meters) altitude above ground level. A height of 1440 feet (439 meters) may be assumed for Stage 1 or Stage 2 four engine airplanes. The altitude of the aircraft as it passes the microphone stations must be within +500 to -0 feet (+150 to -0 meters) of the target altitude For aircraft powered by other than turbojet engines, the altitude for maximum sideline noise must be determined experimentally.
- (3) Relative humidity and ambient temperature over that portion of the sound propagation path between the aircraft and a point 10 meters above the ground at the noise measuring station is such that the sound attenuation in the one-third octave band centered a 8 kHz is not greater than 12 dB/ 100 meters and the relative humidity is between 20 and 95 percent, inclusively. However, if the dew point and dry bulb temperature used for obtaining relative humidity are measured with a device which is accurate to within ±0.5 °C, the sound attenuation rate shall not exceed 14 dB/100 meters in the one-third octave band centered
- (4) Average wind velocity 10 meters above ground is not to exceed 12 knots and the crosswind velocity for the airplane is not to exceed 7 knots. The average wind velocity shall be determined using a thirty-second averaging period spanning the 10 dB down time interval. Maximum wind velocity 10 meters above ground is not to exceed 15

knots and the crosswind velocity is not to exceed 10 knots during the 10 dB down time interval.

12. Section A36.3 is amended by revising paragraphs (c)(2), (d)(2), (d)(5), (d)(6), and (e)(7) to read as follows:

Section A36.3 Measurement of aircraft noise received on the ground.

(2) The microphone must be a pressure sensitive capacitive type, or its approved equivalent, such as free field type with incidence corrector.

(i) After an adequate "warm-up" period, at least as long as that specified by the equipment manufacturer, the system output for constant acoustical input shall change by not more than 0.3 dB within any one hour nor by more than 0.4 dB within 5 hours.

(ii) The variation of microphone and preamplifier system sensitivity within an angle of ±30 degrees of grazing (60-120 degrees from the normal to the diaphragm) must not exceed the following values:

| Frequency (Hz) | Change in sensitivity (dB) |
|-----------------|----------------------------|
| 45 to 1,120 | 1 |
| 1,120 to 2,240 | 1.5 |
| 2,240 to 4,500 | 2.5 |
| 4,500 to 7,100 | 4 |
| 7,100 to 11,200 | 5 |

With the wind screen in place, the variation in sensitivity in the plane of the diaphragm of the microphone system shall not exceed 1.0 dB over the frequency range 45 to 11,200 Hz. * * *

(2) A set of 24 consecutive one-third octave filters must be used. The first filter of the set must be centered at a geometric mean frequency of 50 Hz and the last filter at 10,000

(i) The output of each filter must contain

less than 0.5 dB ripple.

(ii) The correction for effective bandwidth relative to the response at the center frequency response for each one-third octave band filter must be determined by measuring the filter response to sinusoidal signals at a minimum of 20 frequencies equally spaced between the two adjacent preferred one-third octave frequencies or by using an approved equivalent procedure.

(5) The averaging properties of the integrator must be tested as follows:

(i) White noise must be passed through the 200 Hz one-third octave band filter and the output fed in turn to each detector/integrator. The standard deviation of the measured levels must then be determined from a large number of samples of the filtered white noise taken at intervals of not less than 5 seconds. The value of the standard deviation must be within the interval 0.48 ± 0.06 dB for a probability limit of 95 percent. (An approved equivalent method may be substituted for this test on those analyzers where the test signal cannot readily be fed directly to each detector/integrator.)

(ii) For each detector/integrator, the response to a sudden onset or interruption of a constant amplitude sinusoidal signal at the respective one-third octave band center, frequency must be measured at sampling times 0.5, 1.0, 1.5, and 2.0 seconds after the onset or interruption. The rising responses must be the following amounts before the steady-state level:

| 0.5 | seconds | 4.0±1.0 dB |
|-----|---------|----------------|
| 1.0 | seconds | 1.75 ± 0.75 dB |
| 1.5 | seconds | 1.0±0.5 dB |
| 20 | seconds | 06+05 dB |

(iii) The falling response must be such that the sum of the decibel readings (below the initial steady-state level) and the corresponding rising response reading are 6.5 ± 1.0 dB, at each sampling time.

(iv) Analyzers using true integration cannot meet the requirements of paragraphs (d)(5) (i), (ii), and (iii) of this section directly, because their overall average time is greater than the sampling interval. For these analyzers, compliance must be demonstrated in terms of the equivalent output of the data processor. Further, in cases where readout and resetting require a dead-time during acquisition, the percentage loss of the total data must not exceed one percent.

(6) The sampling interval between successive readouts shall not exceed 500 milliseconds and its precise value must be known to within ±one (1) percent. The instant in time by which a readout is characterized, shall be the midpoint of the average period. (The averaging period is defined as twice the effective time constant

of the analyzer.)

(e) * * *

(7) A performance calibration analysis of each piece of calibration equipment, including piston phones, reference microphones, and voltage insert devices, must have been made during the six calendar months preceding the beginning of each day's test series. Each calibration must be traceable to the National Bureau of Standards.

13. Section A36.5 is amended by revising paragraph (b)(5)(vi) to read as follows:

Section A36.5 Reporting and correcting measured data.

* (b) * * * (5) * * *

(vi) Engine performance parameters relevant to noise generation, such as net thrust, engine pressure ratio, exhaust temperatures, and fan or compressor rotational speeds.

14. Section A36.5(c)(1) is amended by adding the word "homogeneous" ahead of the words "noise certification reference."

15. Section A36.5(c)(2)(i) is revised to read as follows:

* * * *

(c) (2) * * *

(i) Maximum landing weight, except as provided in § 36.1581(d) of this part;

16. Section A36.5(d)(3) is amended by revising the first sentence up to the words "octave band" to read as follows:

(d) · · ·

(3) Aircraft sound pressure levels within the 10 dB-down points (described in section B36.9 of Appendix B) must exceed the mean background sound pressure levels determined under section A36.3(f)(3) by at least 3 dB in each one-third octave band * * *

17. Sections A36.5(d) (4) and (5) are added to read as follows:

*

(d) * * *

* (*)

(4) Where more than seven one-third octaves are within 3 dB of the ambient noise levels, a time/frequency interpolation of the noise data shall be performed using an

approved procedure.

- (5) If equivalent test procedures, different from the reference procedures are used, the test procedures and all methods for adjusting the results to the reference procedures must be approved by the FAA. The amounts of adjustments must not exceed 16 EPNdB on takeoff and 8 EPNdB on approach, and if the adjustments are more than 8 EPNdB and 4 EPNdB respectively, the resulting numbers must not be within 2 EPNdB of the appropriate Appendix C noise levels including tradeoffs.
- 18. Section A36.5(e) is amended by substituting the word "mean" for the word "average" each place it appears and by adding a new paragraph (4) to read as follows:

(e) * * *

- (4) If equivalent procedures are to be used to certificate several airplane configurations of the same type from noise tests of a single airplane, the test procedures and analysis methods must be approved by the FAA. The request for approval must identify the noise measurement test procedures and data base, the airplane configurations, procedures and analysis methods, the method for establishing the 90 percent confidence limit for each noise certification level, and the proposed equivalent procedures.
- 19. Section A36.9 is amended by revising paragraph (b)(1) and (d)(2) to read as follows:

Section A36.9 Atmospheric attenuation of sound.

(b) * *

(1) The wind velocity, temperature and relative humidity measurements required under this part must be measured in the vicinity of the noise measuring stations. The location of the meteorological measurements must be approved by the FAA as representative of those atmospheric conditions existing near the surface over the geographical area in which aircraft noise measurements are made. In some cases, a fixed meteorological station (such as those found at airports or other facilities) may meet this requirement.

(d) * * *

(2) If the atmospheric absorption coefficients do not vary over the PNLTM sound propagation path by more than \pm 1.6 dB/1000 ft (± 0.5 dB/100 meters) in the 3150 Hz one-third octave band from the value of the absorption coefficient derived from the meteorological measurement obtained at 10 meters above the surface, the mean of the values of the atmospheric absorption coefficients at 10 meters above the surface and at the altitude of the aircraft at PNLTM may be used to determine the atmospheric attenuation rates for each one-third octave band. The resulting atmospheric attenuation rate may be used to compute the PNLTM correction under section A36.11(d) of this appendix.

20. Section A36.11 [Amended].

a. Section A36.11(a)(3)(v) is amended by removing the phrase "in the form of curves or tables giving the variation of

EPNL with approach angle."

b. Section A36.11(e) introductory text is amended by revising the first sentence to read as follows: "If the measured takeoff and approach flight paths do not conform to those prescribed as the corrected and reference flight paths, under sections A36.11 (b) and (c) respectively, it will be necessary to apply duration corrections to the EPNL values calculated from the measured data."

c. Section A36.11(e) is amended by revising paragraph (1) up to the words "which represents", (2) up to the words "where NT is", and (3) up to the words "where LX and LXc are" to read as follows:

Section A36.11 Detailed correction procedures.

(1) Takeoff flight path. For the takeoff flight path shown in Figure A3, the correction term is calculated using the formula—

 $\Delta 2 = -7.5 \log (KR/KRc)$ which represents * * *

(2) Approach flight path. For the approach

flight path shown in Figure A6, the correction term is calculated using the formula— $\Delta 2 = -7.5 \log (NT/393)$

where NT is * * *

(3) Sideline flight path. For the sideline flight path, the correction term is calculated during the formula—

 $\Delta 2 = -7.5 \log (LX/Lxc)$ where LX and LXc are * * *

d. Section A36.11(f) introductory text, (1), (2) introductory text up to the words "the noise levels", and (2)(ii) up to the words "noise evaluation" are revised as follows:

(f) Nonstandard location correction. When takeoff and approach noise measurements are conducted at points other than those prescribed in section C36.1 of Appendix C, the EPNL value computed from these measurements must be corrected to the value that would have occurred at the prescribed

measuring points under one of the following

procedures:

(1) Simplified procedure. Unless the amount of adjustment exceeds 8 dB on takeoff or 4 dB on approach, or the correction results in a final EPNL value which is within 1.0 dB of the noise levels prescribed in Appendix C of this part, the correction procedures prescribed in paragraphs (d) and (e) of this section may be used. Since this procedure accounts for extrapolation of PNLTM from the close-in measurement station to the prescribed measuring point, the remaining corrections for differences between test and reference conditions, including thrust and airspeed, must be made afterward.

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5,0

(2) Integrated procedure. If the correction factor exceeds 8 dB on takeoff or 4 dB on approach, or the correction results in a final EPNL value which is within 1.0 dB of the noise levels * * *

(ii) After the measured one half (½) second spectra have been corrected to the measuring points prescribed in section C36.1 of Appendix C, the remaining noise evaluation * * *

Appendix B—Aircraft Noise Evaluation Under § 36.103

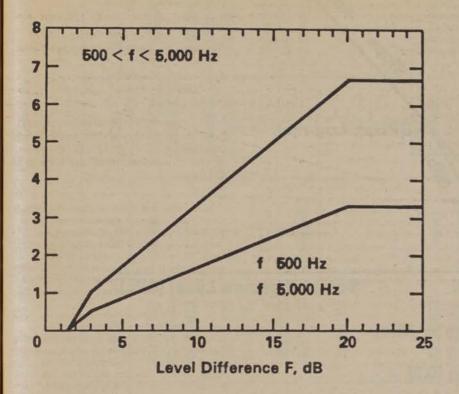
21. Section B36.5(h) is amended by replacing "zero" with "one and a half".

22. The graph and Table B2 now appearing in section B36.7(a) is moved into section B36.5(i) and revised to read as follows:

Section B36.5 Correction for spectral irregularities.

(i) · · ·

Table B2 — Tone Correction Factors



| Frequency f, Hz | Level difference F, dB | Tone correction C, dB |
|---|--|--------------------------|
| 50 <f<500< td=""><td>1½*≤F<3 3≤F<20 20≤F</td><td>F/6</td></f<500<> | 1½*≤F<3 3≤F<20 20≤F | F/6 |
| 500≤f≤5,000 | 1½* <f<3 3<f<20 20<f< td=""><td>F/3</td></f<></f<20 </f<3 | F/3 |
| 5,000 <f<10,000< td=""><td>1½*<f<3 3<f<20 20<f< td=""><td>F/6</td></f<></f<20 </f<3 </td></f<10,000<> | 1½* <f<3 3<f<20 20<f< td=""><td>F/6</td></f<></f<20 </f<3 | F/6 |

* See Step 8.

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23. Section B36.9(c) is amended by revising the definition of Δt as follows:

Section B36.9 Duration correction.

(c) * * *

* * *

Δt=0.5 sec. (or the approved sampling time interval), and

* 24. Section B36.9(f) is revised to read as follows:

(f) The aircraft testing procedures must

include the 10 dB-down points in the flyover noise/time record.

. .

25. Section B36.11(c) is added to read as follows:

Section B36.11 Effective perceived noise level.

(c) If, during a test flight, one or more peak values of PNLT are observed which are within 2 dB of PNLTM, the value of EPNL shall be calculated for each, as well as for PNLTM. If any EPNL value exceeds the value at the moment of PNLTM, the maximum value of such exceedance must be added as a further adjustment to the EPNL calculated from the measured data.

26. Section B36.13 is amended by revising paragraphs (a) and (b), Figure B3 and adding Table B4 to read as follows:

Section B36.13 Mathematical formulation of noy tables.

(a) The relationship between sound pressure level and perceived noisiness given in Table B1 is illustrated in Figure B3. The variation of log (n) with SPL for a given one-third octave band can be expressed by straight lines as shown in Figure B3.

(1) The slopes of the straight lines M(b), M(c), and M(d) and M(e);

(2) The intercepts of the lines on the SPL

axis, SPL (b) and SPL (c); and
(3) The coordinates of the discontinuities,

SPL (a) and $\log n(a)$; SPL (d) and $\log n = -1.0$; and SPL (e) and $\log n = \log (0.3)$.

(b) The important aspects of the mathematical formulation are:

(1) SPL > SPL (a)

n = antilog [M(c)*(SPL-SPL(c))]

(2) SPL (b) < SPL < SPL (a)

n = antilog [M(b)*(SPL-SPL(b))]

(3) SPL (e) < SPL < SPL (b)

n = antilog [M(e)*(SPL-SPL(b))]

(4) SPL (d) < SPL < SPL (e)

n = 0.1 antilog [M(d)*(SPL-SPL(d))] (c) * * *

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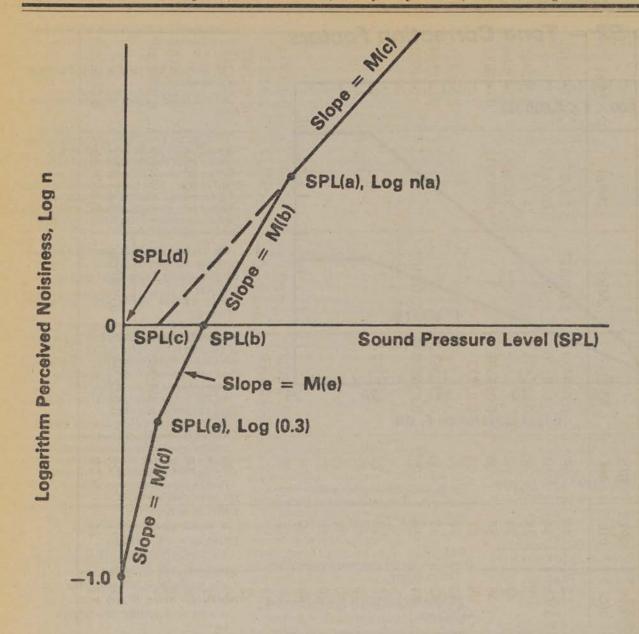


Fig. B3. Perceived Noisiness As a Function of Sound Pressure Level.

Constants for Mathematically Formulated NOY Values Table B4

| | M(e) | 0.058098 | " | 0.052288 | 0.047534 | 0.043573 | " | 0.040221 | 0.037349 | 0.034859 | A DELEGIS | | | | | • | 0.034859 | 0.040221 | 0.037349 | 0.034859 | + | | 0.034859 | 0.037349 | | | 0.043573 |
|--------------------|------|----------|----------|----------|---------------|----------|----------|---|----------|----------|--|----------|-----|--|-----|----------|----------|------------|------------|---|-----------------|-----------|----------|----------|---|----------|-----------------|
| THE REAL PROPERTY. | (P)W | 0.079520 | 0.068160 | : | 0.059640 | 0.053013 | - | | | | TO SOUTH THE PARTY OF THE PARTY | | | | • | 0.053013 | 0.059640 | 0.053013 | : | 0.047712 | and of the last | 0.053013 | | 0.068160 | | 0.079520 | 0.059640 |
| | M(c) | 0.030103 | 1 | | STATE SPECIAL | | | Allega and and and and and and and and and an | . 4 | 0.030103 | 1 | | | | | | Not | Annilonhia | Applicable | - To | San A | to he was | 100 | 1 10 | 100000000000000000000000000000000000000 | 0.029960 | |
| | M(b) | 0.043478 | 0.040570 | 0.036831 | " | 0.035336 | 0.033333 | : - | 0.032051 | 0.030675 | | 0.030103 | 1 | The state of the s | | 1 | 0.030103 | 0.029960 | * | | | | | 0.029960 | | 0.042285 | LINE CONTRACTOR |
| SPL | (e) | 55 | 51 | 46 | 42 | 39 | 36 | 33 | 30 | 27 | | 25 | 25 | 25 | 25 | 25 | 23 | 21 | 18 | 15 | 14 | 14 | 15 | 17 | | 23 | 29 |
| SPL | (p) | 49 | 44 | 39 | 34 | 30 | 27 | 24 | 21 | 18 | | 16 | 16 | 16 | 16 | 16 | 15 | 12 | 6 | ro. | * | 5 | 9 | 10 | | 17 | 21 |
| SPL | (c) | 52 | 51 | 49 | 47 | 46 | 45 | 43 | 42 | 41 | The same of | 40 | 40 | 40 | 40 | 40 | 38 | 34 | 32 | 30 | 29 | 29 | 30 | 31 | | 34 | 37 |
| SPL | (p) | 64 | 09 | 99 | 53 | 51 | 48 | 46 | 44 | 42 | | 40 | 40 | 40 | 40 | 40 | 38 | 34 | 32 | 30 | 29 | 29 | 30 | 31 | | 37 | 41 |
| SPL | (a) | 91.0 | 85.9 | 87.3 | 79.9 | 79.8 | 76.0 | 74.0 | 74.9 | 94.6 | | 8 | + | | | | | | | | | | • | 8 | | 44.3 | 50.7 |
| 4- | Hz | 50 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | | 400 | 200 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 2000 | 6300 | | 8000 | 10000 |
| Band | 0 | - | 2 | 3 | 4 | ro. | 9 | 7 | 80 | 60 | | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | | 23 | 24 |

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Appendix C—Noise Levels for Transport Category and Turbojet Powered Airplanes Under § 36.201

27. Section C36.5, the table after paragraph (b)(3), and paragraph (c) is removed.

28. Section C36.7 Takeoff test conditions is retitled Takeoff Reference and Test Limitations.

29. Section C36.7(d) is removed and paragraphs (e) and (f) are redesignated as paragraphs (d) and (e), respectively.

30. Section C36.9 Approach test conditions is retitled Approach Reference and Test Limitations.

31. Section 36.9(d) is removed and paragraphs (e) and (f) are redesignated as paragraphs (d) and (e), respectively.

Issued in Washington, DC, on April 14, 1988.

T. Allan McArtor,

Administrator.

[FR Doc. 88-10005 Filed 5-5-88; 8:45 am]

BILLING CODE 4910-13-M